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TREES FOR ROADSIDE PLANTING



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ONLY THRIFTY, VIGOROUS TREES, with healthy foliage, look well on country roads. To secure this type for any location it is usually best to select those kinds growing near the place, although trees from localities with similar growing conditions are frequently satisfactory.

Oaks, of which there are species native to nearly all parts of the country, are more generally useful for roadside planting than any other kind of tree.

Maples are next in importance for a large part of the country, but as the most-used species are not well adapted for the purpose, the selection must be carefully made.

For the cooler dry regions the most promising trees are the green ash, common locust, hackberry, thornless honeylocust, and poplars, with boxelder, willows, and poplars for the extremes of cold and drought.

In warm dry climates the eucalypts, or gums, the palms, the Jerusalem thorn, and the mesquite are good.

Washington, D. C.

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TREES FOR ROADSIDE PLANTING

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SUCCESS in roadside tree planting depends on properly locating the plants along the highway, selecting suitable varieties, and adequately protecting them from thoughtless human beings, roving stock, and insects and diseases. Their location and care having been discussed in another bulletin,¹ this will be devoted to the kinds of trees available for the different parts of the country.

Roadside trees may be planted for shade for the highway, to add beauty to the landscape, or as a memorial for some person or event. Memorial trees can not adequately serve their purpose unless they provide welcome shade, and they lack dignity of expression if they do not add beauty to their surroundings. In like manner shade can hardly be supplied without also adding beauty, but a road may be made beautiful without being shaded (fig. 1) and without being a memorial.

In order to give the desired expression to any roadside planting, a proper selection of kinds must be made to include those that will thrive in the location, are of appropriate height, spread, and type of branching, with suitable size, texture, and color of foliage, and possibly even with bright-colored bark, attractive flowers, or showy fruits.

KINDS OF TREES SUITABLE FOR THE ROADSIDE

Owing to the great variety of conditions to be met along our highways it is impossible for any one kind of tree to succeed in all places. The best effects are usually produced by giving the predominant place to the common plants of the neighborhood, using introduced plants in subordinate positions. Next in desirability are plants from regions having similar growing conditions either in this country or abroad. Not only do native plants look more at home and thrive better than most introduced kinds but many of them are as attractive as those from any part of the world.

In nearly all parts of the country there are fewer limiting factors in roadside tree planting than are to be found on the streets of

¹ Planting the roadside. U. S. Department of Agriculture, Farmers' Bulletin No. 1481; out of print, but may be consulted in libraries.

cities and towns. At times the fumes or dust from roads treated with oil, tar, or asphalt seemingly have an injurious effect on adjacent vegetation, but these difficulties have not been widespread considering the quantity of such materials in use. On the other hand, town and city streets are so far divorced from natural surroundings by artificial conditions that exotic trees can be used appropriately, as may be seen in many places where Lombardy poplars, Norway maples, English elms, or European lindens have been planted with satisfactory results.

Although growing conditions for roadside trees are mainly far better than for town trees, yet there are conditions and limitations that make it desirable at times to restrict the choice of trees for this purpose. In semiarid and desert regions the number of kinds that will grow is often limited to two or three native species, and these are sometimes difficult to transplant without being given water



FIG. 1.—A beautiful unshaded road

for a year or two, which it is often practically impossible to supply. However, even here roadside growths may be encouraged, although they may not be so attractive as the vegetation of more humid regions.

In many parts of the country the conception of property rights is so loose that people act as though anything in the public highway belongs to the person who can first lay hands on it, even though the law says it belongs to the adjacent landholder. Trees bearing showy flowers or berries, as well as trees bearing either edible or inedible fruits or nuts, are especially subject to mutilation. These should not be planted until conditions that might make their use objectionable are seriously considered. In addition to taking the fruit, the despoilers often wantonly break off whole limbs in order to get at the fruit. In one case, after a row of cherry trees along a road outside a cherry orchard was broken to pieces, the attacks were continued on the orchard, although there was a good fence

between. After the roadside trees were removed, there was no further theft from the orchard.

There is probably less trouble from such vandalism in sections more remote from large cities, although near many industrial centers there is less of this than in some rural districts. Protection for roadside trees is more dependent on community integrity and habit of thought than on density of population.

Plantings adjacent to highly cultivated lands should be such as will interfere as little as possible with the crops to be grown, but ample room for roadside planting should be provided even though it may require a wider right of way than is usual in the State. Here, as elsewhere, trees that provide protection, food, and nesting sites for our native birds will help to protect the crops from injurious insects.²

Articles largely based on economic considerations appear periodically in the public press, urging the planting of nut trees on the public highways. Theoretically their suggestion seems very plausible, but a planting made of these trees would usually be a failure economically. However, this should not prevent prospective planters from seriously considering the various nut trees that thrive in their section when studying the available trees for roadside planting. Most nut trees are beautiful; and as they are high headed and make large tops they are less liable to serious injury from marauders when they have a crop of tempting nuts than trees with ripening fruits or showy flowers.

REGIONS OF ADAPTABILITY

Because of the wide diversity of conditions throughout the United States, it is impossible to suggest a single list of good roadside trees suitable to all locations; therefore, a series of lists is given showing trees adaptable to the various regions indicated on the accompanying map. (Fig. 2.) Each region includes an area of approximately similar growing conditions, so that the same kinds of trees will thrive throughout. Many of them include variations of elevation and soil which slightly modify the lists of trees adapted to these different conditions.

In the following pages the general characteristics of these regions are described, with suggestions for trees that may be expected to grow in each, and a table is given at the end of this bulletin showing in which of these regions the trees mentioned may be expected to thrive. (See Table 1.) Only the larger trees are included, the smaller trees suited for undergrowths and decorative plantings, such as dogwoods and redbud, are not considered. Likewise few cone-bearing trees are suggested in regions where there is a long list of good deciduous trees. The heights given in the text are those which the trees attain under favorable conditions, while those in Table 1 indicate what reasonably may be expected under roadside conditions in the regions most favorable to their growth.

Region 1

Region 1 comprises the Pacific coast west of the Coast Range, from Santa Cruz Bay to the Canadian line. Its characteristics are cool dry summers with frequent fogs and

² For further information and suggestion, see United States Department of Agriculture, Farmers' Bulletin No. 1644, entitled "Local Bird Refuges."

heavy winter rainfall, with the lowest temperatures 8 to 10 degrees below freezing in the north to about freezing in the south.

In the northern part of this region most of the native trees of the eastern United States and those of western Europe may be grown.

Some of the more important deciduous trees are London planetree, English elm, Oregon maple, madrone, European linden, California walnut, black walnut, American elm, Huntingdon elm, California planetree, honeylocust, and common locust, closely followed in desirability by white ash, green ash, European ash, red oak, white oak, pin oak, ginkgo, American linden, sugar maple, sycamore maple, and Norway maple.

Evergreens likely to succeed in the southern part are the redwood, the California live oak, deodar, and giant sequoia.

Region 2

Region 2 includes the Willamette Valley in Oregon and the region of similar climate north of it in Washington, including the shores of Puget Sound. The summers are warmer and drier than in region 1, and the average lowest temperatures are from 10° to 20° F.

Deciduous trees likely to be most successful in this region are Oregon maple, madrone, chestnut, honeylocust, white oak, sugar maple, California walnut, black walnut, cascara buckthorn, and common locust; those rather less uniformly adapted are English elm, London planetree, American planetree, American elm, sycamore maple, tuliptree, European linden, American linden, white ash, green ash, European ash, the hickories, English oak, red oak, pin oak, and ginkgo.

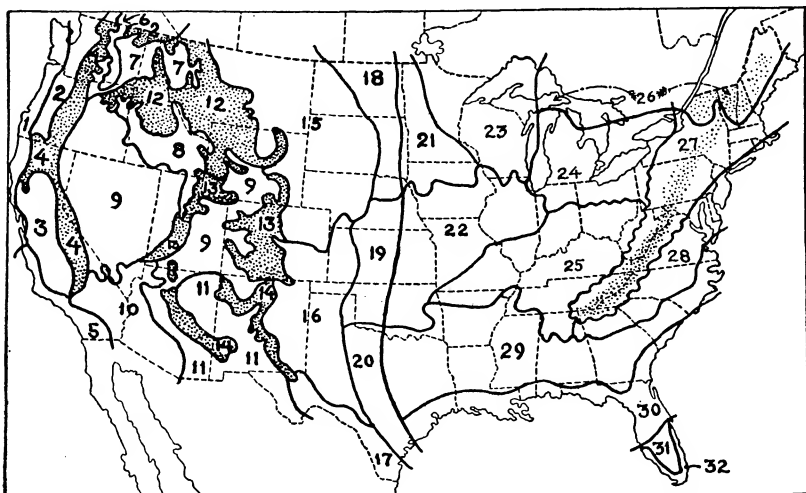


Fig. 2.—Map of the United States, showing by numbers within the heavy border lines the regions having approximately similar growing conditions for the same elevation. The stippled areas are mountain regions

Region 3

Region 3 comprises the Sacramento and San Joaquin Valleys in California. This region has hot dry summers and mild winters with 15 to 20 inches of rainfall. The temperature drops to 8 or 10 degrees below freezing on the valley floor with slightly higher temperatures on the hillsides. Alkali is often present.

Trees best suited to most of this region are London planetree, California walnut, American elm, English elm, California white oak, velvet ash, California planetree, Oregon ash, flowering ash, goldenrain-tree, Oregon maple, honeylocust, and California live oak. Some that are not so desirable are madrone, Lombardy poplar, Carolina poplar, cottonwood, Norway maple, silver maple, common locust, and ailanthus.

In the southern part of the region there are several evergreen trees that are desirable, including some of the eucalypts, such as blue gum, red gum, manna gum, and gray gum; also Arizona cypress, deodar, California incense-cedar, Monterey pine, Aleppo pine, bottle-trees, and the California big tree; palms may be used for formal effects and the acacias where small trees are needed. Additional deciduous trees for the southern part are athel, Texas umbrella-tree, and chinaberry.

Region 4

Region 4 includes the Sierra Nevada and Cascade Ranges. Conditions here vary considerably according to elevation and slope, the eastern side of the mountains being much drier than the western. Many native trees are excellent at the different altitudes, but at lower levels the valley plants are suitable.

Among the deciduous trees for this region are London planetree, common locust, English elm, Oregon maple, American elm, mossycup oak, and chestnut. Good ever-

greens are southern magnolia, incense-cedar, sugar pine, and digger pine. The native madrone is good for the northern half of the region, while the giant sequoia, or big tree, is suited to elevations of 3,500 feet to 8,000 feet.

Region 5

Region 5 comprises the coast west of the Coast Range from Santa Cruz to Santa Barbara, thence to San Diego, Redlands, and Riverside, including what is popularly known as "Southern California." The summers are dry, cool on the coast and warm inland; the winters are moderately rainy, from 30 inches in the mountains to 10 inches in the valleys, being nearly free from frost on the coast and in the foothills.

This is a region primarily for evergreen trees, but deciduous trees adapted to it are London planetree, California walnut, velvet ash, English elm, valley white oak, golden-rain-tree, silktree, beefwoods, and such short-lived trees as athel, chinaberry, and Texas umbrella-tree.

Among the evergreens are California live oak, cork oak, Arizona cypress, camphortree, rubber-tree, Guadalupe cypress, peppertree, several eucalypts (such as blue gum, red gum, sugar gum, lemon gum, Port Gregory gum, manna gum, redbox, and desert gum), Monterey cypress, Monterey pine, carob, California incense-cedar, deodar, smooth cypress, Aleppo pine, silk-oak, various palms for formal effect, and where dwarf trees are desirable acacias and pittosporum.

Region 6

Region 6 is the Columbia River Valley in eastern Washington. The summers are warm; the winters have ordinary temperatures of 10° to 15° F., with extremes occasionally of zero. The annual rainfall varies from 7 to 20 inches, mostly in winter and spring.

Deciduous trees for this section are London planetree, English elm, European lindens, green ash, common locust, European ash, white ash, Norway maple, and red oak.

Evergreen trees are western white pine, Rocky Mountain redcedar, western redcedar, Alberta spruce, and western yellow pine.

Region 7

Region 7 includes the plateau of the eastern part of the State of Washington and the valleys of northern Idaho and western Montana. The summers are warm, and the lowest winter temperatures range from zero to 15° F., with an annual rainfall of 10 to 20 inches.

Deciduous trees for this region are green ash, honeylocust, common locust, Norway maple, sycamore maple, and several of the poplars, including the cottonwood, Carolina poplar, silver poplar, black balsam poplar, balsam poplar, and quaking aspen.

Some trees suitable to special localities within this region are red oak, chestnut oak, Scotch elm, English oak, scarlet oak, European lindens, corkbark elm, and English elm.

Region 8

Region 8 is the Snake River plains and the Utah Valley. It is a semiarid country with water available for irrigation. The summers are hot and the winters often have minimum temperatures of zero to 10° below F., with a rainfall of 9 to 15 inches, mostly in winter.

The most promising trees for this region are green ash, honeylocust, and common locust. Trees adapted to portions of this country are corkbark elm, Norway maple, sycamore maple, many of the poplars, and the silver maple in moist situations protected from winds.

Promising evergreens are Rocky Mountain redcedar and smooth cypress.

Region 9

Region 9 is the northern part of the great arid interior plateau included in the States of Oregon, Nevada, and Utah. Its characteristics are hot days and occasional frosty nights in summer, with cold winters and about 10 inches of rainfall annually.

The most promising trees for this region are green ash, honeylocust, common locust, boxelder, and cottonwoods (including bolleana poplar, Fremont cottonwood, Siberian poplar, Petrovski poplar, smoothbark cottonwood, and narrowleaf cottonwood).

Region 10

Region 10 includes all the southwestern desert, including portions of California, Arizona, and a corner of Nevada. The climate is hot to scorching, with a rainfall of 3 to 10 inches.

The most promising deciduous trees for this region are athel, common locust, native cottonwoods, nogal, honeylocust, Mexican walnut, green ash, Chinese elm, and boxelder.

Perhaps better suited than the deciduous trees to the conditions found in this region are some of the evergreens, such as the desert gum, red gum, redbox, Jerusalem thorn, carob, and palms (including Texas palmetto and the Washington palms).

Region 11

Region 11 comprises the southern part of the great arid interior plateau included in the States of New Mexico and Arizona. Its characteristics are the same as the plateau farther north (region 9) except that the temperatures are higher.

The most promising deciduous trees for this section are honeylocust, green ash, common locust, nogal, Mexican walnut, desert willow, hackberry (both the common form and the Mississippi hackberry), native cottonwoods, and other poplars. The Chinese elm will do well in naturally well-watered valleys or on ditch banks.

Trees that ordinarily are not so desirable as the foregoing but which will probably stand drought as well and help to give variety are chinaberry, Texas umbrella-tree, and ashleaf maple.

Two evergreens that with irrigation are likely to prove as satisfactory as any trees in this region are Jerusalem thorn and Texas palmetto, while eucalypts would do well on banks of irrigation ditches or other moist places.

Region 12

Region 12 is that part of the Rocky Mountains included in Idaho, Montana, Wyoming, Washington, and Oregon. The temperature and rainfall vary greatly, depending on elevation and exposure. Many places are suitable for a great variety of plants; others are suited only to a few.

Green ash and hackberry are the trees most to be depended upon in region 12, although in many parts of this territory boxelder and some of the poplars also are successfully grown, such as southern cottonwood, narrowleaf cottonwood, smoothbark cottonwood, silver poplar, quaking aspen, balm-of-Gilead, black balsam poplar, and balsam poplar. Suitable evergreens are Rocky Mountain redcedar and western yellow pine.

Other trees that do well under favorable conditions are American elm, if watered the first few years, red oak, black walnut, and corkbark elm.

Region 13

Region 13 includes the Rocky Mountains of Utah and Colorado and is similar to the region farther north, except that the temperatures for the same elevation are about 7 degrees warmer. The trees that can be used at an elevation of 4,000 feet in region 12 can be used at 6,000 feet in this region.

Green ash and goldenrain-tree are perhaps the two most satisfactory trees for this section, although the southern cottonwood and some of the other poplars are also desirable. Other good trees are the common locust, hackberry, honeylocust (especially the thornless form), Chinese elm, and Rocky Mountain redcedar. A less valuable tree that does well here is the boxelder.

Region 14

Region 14 is the Rocky Mountains of Arizona and New Mexico. It is similar to the region farther north except that temperatures for the same elevation average about 6 degrees warmer than in region 13, and 13 degrees warmer than in region 12. Allowing 3 to 4 degrees of temperature for each 1,000 feet of elevation would make possible the growing of any particular tree in region 14 at an elevation 1,500 feet higher than in region 13 when the moisture conditions are similar.

Among the trees succeeding in this section are green ash, common locust, hackberry, thornless honeylocust, goldenrain-tree, some of the poplars, or cottonwoods. Nogal, Mexican walnut, and Emory oak can be used in well-watered valleys and along ditch banks. Boxelder is worth trying where the others fail.

Region 15

Region 15 is the northern Great Plains area south to Kansas and Colorado, extending from about the 5,500-foot contour on the west to the black soils on the east. It is extremely cold in winter in the northeastern portions, usually dropping to -30° or -40° F., while close to the mountains it is 20 degrees warmer. The summers are moderately warm. It is generally recognized as the northern part of the dry-farming area, with a rainfall of about 15 inches.

Only the hardiest and toughest plants can be grown here. Green ash, common hackberry, Chinese elm, balsam poplar, black and golden willows, American larch, and boxelder are the most promising trees. When water is available for a few years American elm will be likely to become established, and in parts of the region at least there may be grown mossycup oak, black walnut, western yellow pine, and Rocky Mountain redcedar. In the colder sections, as in North Dakota, and in the higher elevations of the Black Hills in South Dakota the golden willow and the Black Hills spruce may be used.

Region 16

Region 16 is the central portion of the Great Plains, including the Plains portions of Kansas, Oklahoma, and New Mexico; also portions of the Plains in Colorado and Texas. It extends eastward from about the 6,500-foot contour on the west to the black soils on the east. The rainfall varies from 12 to 22 inches. The climate is warmer and has a greater evaporation than in region 15. It is the southern portion of the dry-farming area.

The trees most likely to be satisfactory in all parts of this section are hackberry, southern cottonwood, green ash, common locust, honeylocust, Chinese elm, and American elm if watered the first few years.

Other trees that are likely to succeed over most of this territory are American planetree, red ash, and silver poplar. Less desirable trees that may be useful under especially trying conditions are boxelder, Osage-orange, Russian-olive, and Russian mulberry.

In the warmer portions, as in parts of Texas and New Mexico, chinaberry, Texas umbrella-tree, and paper-mulberry may be grown, together with such evergreens as jack pine, western yellow pine, redcedar, deodar, and Arizona cypress.

Region 17

Region 17 is the dry hot portion of southwestern Texas, with 12 to 22 inches of rainfall, but excessive evaporation.

The most promising trees for this section are the Jerusalem thorn, Chinese elm, Canary date palm, Washington palms, athel, chinaberry, cottonwoods, Texas umbrella-tree,

and cats-claw, while Texas palmetto, Victoria palmetto, and cabbage palmetto succeed. In many parts other trees may be grown, such as honeylocust, common locust, green ash, silver poplar, paper-mulberry, and white mulberry. Where the foregoing do not thrive it is possible that boxelder, Russian-olive, black willow, and Osage-orange may be grown, while the live oak may prove to be suitable in the moister situations. The native mesquite is one of the most valuable trees of this region for roadside planting, but those collected from the wild are hard to transplant because of lack of preparatory root pruning and a corresponding lack of a well-developed root system that can be moved with the tree. When they can be saved near the road it certainly should be done.

Region 18

Region 18 is the subhumid black-soils country lying east of the dry-farming area of the northern Great Plains and is intermediate as to moisture between region 15 and the more humid area to the east of it. The winters are very cold and dry.

Probably the most useful trees in this section are the green ash, common locust, cottonwoods and, where the others do not succeed, the boxelder and willows. Slower growing trees that are likely to be satisfactory are mossycup oak, Chinese elm, Rocky Mountain redcedar, and jack pine.

Region 19

Region 19 is the subhumid black-soils area of Kansas, southern Nebraska, and much of Oklahoma. There is more moisture than in the dry-farming country to the west of it and less than in the area farther east. It is a locality of sudden variation in winter temperatures and of hot winds in summer.

Trees suited to this region are the mossycup oak, Chinese elm, goldenrain-tree, hackberry, common locust, honeylocust, green ash, American elm if watered for a few years after transplanting, red oak, pin oak, and American planetree. Other good trees that can be used in many parts of the region to advantage are post oak, cork elm, and English elm. Where other trees do not succeed the poplars can be used, such as southern cottonwood, Carolina poplar, Fremont cottonwood, and narrowleaf cottonwood; also the ailanthus.

Region 20

Region 20 is the subhumid or transition region of central Texas with black and chocolate-colored soils. In moisture conditions it is intermediate between the dry-farming regions farther west and the humid climate of eastern Texas.

Among the best trees for this section are the pecan, Mississippi hackberry, cedar elm, Chinese elm, mossycup oak, goldenrain-tree, London planetree, American planetree, willow oak, Texas red oak, southern red oak, pin oak, post oak, chinquapin oak, green ash, and black walnut, with bottletrees for the southern part.

Available evergreen trees are live oak, laurel oak (often called water oak), redcedar, deodar, Arizona cypress, Italian cypress, and loblolly pine.

Region 21

Region 21 is in the northern part of the prairie country, with frequent droughts of more than 30 days in the western portion and cold winters with drying winds. The rainfall is 20 to 30 inches, occurring mostly in the summer season.

The most dependable trees for this region are the green ash, American elm, mossycup oak, and American linden. Other good trees are red oak, Chinese elm, red maple, followed by red ash, pin oak, Norway maple, and hackberry.

If evergreen trees should be desired, the white spruce and red pine are adapted to this section.

Region 22

Region 22 is that portion of the prairie country having higher temperatures than region 21, but subject to similar cold drying winds in winter. The rainfall is 30 to 40 inches.

Trees adapted to these conditions are American elm, red oak, black walnut, American planetree, mossycup oak, white ash, green ash, pecan, white oak, Kentucky coffeetree, pin oak, hackberry, Chinese elm, black cherry, southern cottonwood, and Carolina poplar.

Region 23

Region 23 is the western part of the Great Lakes forest area. The eastern portion is slightly warmer and more humid than the western portion, the latter much resembling region 21.

Here the useful trees are American elm, red oak, American linden, sugar maple, Chinese elm, white ash, mossycup oak, green ash, hackberry, swamp white oak, red maple, and Norway maple.

Available cone-bearing trees are white spruce, red pine, Austrian pine, white pine, Scotch pine, jack pine, and American larch.

Region 24

Region 24 is largely that part of the country influenced by the Great Lakes, lying east of Lake Michigan, extending south into Ohio and eastward to Lake Ontario. There is considerable moisture in the atmosphere, in addition to a rainfall of 30 to 40 inches, rather well distributed through the year. The winter temperatures are more moderate than in region 23, and there is usually a good snow covering.

Many species of both native and introduced trees will thrive here, some of the best of the deciduous kinds being the sugar maple, American elm, red oak, black walnut, American linden, white oak, white ash, mossycup oak, scarlet oak, swamp white oak, followed closely by red maple, tupelo, American planetree, slippery elm, Kentucky coffeetree, Norway maple, beech, and ginkgo. For the southern portions there may be added tulip-tree, pin oak, shingle oak, London planetree, shagbark hickory, and pignut.

Region 25

Region 25 includes the Ohio and lower Tennessee River valleys and the Ozark Mountain region. The winter temperatures are rather moderate with much alternate freezing and thawing; the summer is warm with a 30-day drought often occurring near its close. The rainfall is 40 to 50 inches.

A large number of native and introduced trees are available here, some of the best of which are red oak, sugar maple, tuliptree, black walnut, American planetree, American elm, mossycup oak, pecan, sweetgum, white oak, scarlet oak, pin oak, cucumbertree, American linden, white ash, London planetree, swamp white oak, southern red oak, chestnut oak, shingle oak, red maple, ginkgo, tupelo, bigleaf magnolia, beech, and hickories.

Region 26

Region 26 includes the colder sections of the eastern United States, comprising much of Maine, the mountainous portions of New Hampshire, Vermont, and New York, and a part of northern Michigan. It is characterized by cold winters with heavy snowfall and short summers of long days and cool nights with abundant rainfall.

Because of the severe winters, fewer deciduous trees thrive here than in the regions to the south; but the native vegetation has many coniferous evergreens that may be used whenever this type of tree is desirable.

Deciduous trees that will succeed in this region are American elm, red oak, sugar maple, white ash, birches (including yellow, sweet, and canoe), American linden, red maple, shagbark hickory, black maple, striped maple, beech, black willow, balm of Gilead, and largetooth aspen, with such cone-bearing trees as white pine, red pine, white spruce, American larch, hemlock, and arborvitae.

Region 27

Region 27 is the Appalachian Mountain country, including much of New England and New York, most of Pennsylvania, and the mountainous portions of the States southward. The rainfall is abundant, usually from 35 to 50 inches, and is well distributed through the season.

Most of the trees native to the cooler portions of the temperate zones thrive under the conditions found here. Some that stand at the head of this large list are red oak, sugar maple, American elm, mossycup oak, American linden, white ash, white oak, red maple, London planetree, American planetree, tuliptree, swamp white oak, chestnut oak, black oak, scarlet oak, pin oak, ginkgo, tupelo, black walnut, and the shagbark and pignut hickories.

Region 28

Region 28 lies just east of region 27 and includes the Piedmont section and some adjoining parts with similar growing conditions. It extends from northern Alabama northeasterly across the Carolinas and Virginia to New Jersey and the coast of Massachusetts. It is warmer than region 27, with abundant rainfall except in late summer when a 30-day drought occasionally occurs. The winters are open, with much freezing and thawing, and but little snow protection is to be relied upon.

Some of the best deciduous trees for this region are the red oak, willow oak, white oak, tuliptree, red maple, pin oak, black walnut, American elm, London planetree, American planetree, swamp white oak, chestnut oak, mossycup oak, shingle oak, scarlet oak, black oak, American linden, white ash, sweetgum, tupelo, European lindens, English elm, ginkgo, sugar maple, and the shagbark, pignut, and mockernut hickories.

Region 29

Region 29 includes most of the cotton country extending from eastern Texas eastward and northward to the Atlantic Ocean in North Carolina and Virginia. It lies between the Piedmont region and the swampy lower coastal plain that borders the Gulf of Mexico and the Atlantic Ocean.

The rainfall is abundant (45 to 60 inches) except toward the last of the rather warm summer, when a long drought frequently occurs, particularly in the western portion.

This is another region most favorable for tree growth, some thriving here that do not succeed farther north, while but few of the more northern trees are not successful. Some of the more desirable trees are live oak, willow oak, pecan, sweetgum, laurel oak, Darlington oak, southern red oak, red oak, tuliptree, American elm, American planetree, London planetree, mossycup oak, overcup oak, pin oak, white ash, tupelo, red maple, ginkgo, winged elm, and American beech. Evergreen trees in addition to live oak, the almost evergreen laurel oak, and the Darlington oak are southern magnolia, holly, longleaf pine, shortleaf pine, loblolly pine, deodar, and redcedar.

Region 30

Region 30 is the swampy Coastal Plain, from Wilmington, N. C., southward along the Atlantic Ocean and westward along the Gulf of Mexico. It has moderate summer temperatures with hot sunshine, short winters, an abundance of rainfall (50 to 60 inches) except in the Texas portion, and is almost subtropical.

The list of trees suited to this section is not so large as for those sections farther inland with heavier soils, but there is ample choice among excellent kinds. Some of these are live oak, laurel oak, including Darlington oak, sweetgum, pecan and other hickories, willow oak, southern red oak, American planetree, London planetree, red maple, Mississippi hackberry, ginkgo, American elm, with such broad-leaved evergreens as the live oak and laurel oak already mentioned, southern magnolia, and holly. For formal or tropical effects some of the palms may be used, such as the cabbage palmetto, Washington palms, Canary date palm, and the Chinese fan palm. Among the cone-bearing trees are the longleaf pine and baldcypress.

Region 31

Region 31 is southern Florida with the exception of the subtropical fringe. It is subject to annual frosts, rather warm summers, and a rainfall of about 50 inches. The vegetation approaches the subtropical, oranges, palms, and the Grevillea, or silk-oak, succeeding.

This is a region where evergreen trees should be largely used, such as live oak, silk-oak, laurel oak, camphor-tree, southern magnolia, rubber-tree, holly, beefwood, and jacaranda, while among the eucalypts being tried to some extent are the swamp mahogany, red gum, manna, and gray gum. If deciduous trees are desired perhaps the most satisfactory are red maple, tupelo, pecan, native hickories, sweetgum, and bald-cypress.

Palms also succeed, such as the Canary date palm, Washington palms, *Cocos plumosa*, Chinese fan palm, and cabbage palmetto.

Region 32

Region 32 is the subtropical coast of southern Florida. It has a slight range of temperatures with seldom a killing frost and a rainfall of 50 to 70 inches. Palms and mangroves are the typical vegetation.

The trees here would be the broadleaf evergreens and palms, such as the live oak, silk-oak, camphor-tree, rubber-tree, southern magnolia, beefwoods, laurel oak, jacaranda, pittosporum, and holly, while some of the eucalypts, like swamp mahogany, red gum, gray gum, and manna gum, may be worth trying.

The royal palm is the most characteristic palm of this region, while the cabbage palmetto is striking in a small area. Others that thrive are the Canary date palm, Washington palms, *Cocos plumosa*, and Chinese fan palm.

TREES FOR SPECIAL PURPOSES

Near industrial plants emitting sulphurous smoke and other products of combustion or industrial processes, where the greatest difficulty is experienced in getting trees to grow, the ailanthus will perhaps thrive when nearly all others fail. The American plane-tree and the London planetree are also good for such places. Frequently the poplars and cottonwoods, especially the southern cottonwood, and the Carolina poplar will grow under these conditions, and their use is desirable.

Trees suitable within the reach of ocean spray or on sandy lands near the coast south to Charleston, S. C., are the red oak and the red maple. Good trees on the southern Atlantic coast and along the Gulf of Mexico are the sweetgum north to New Jersey, and the live oak north to Norfolk, while the California live oak can be used from San Francisco southward. Trees that endure the most alkali appear to be the goldenrain-tree, London planetree, blue ash, velvet ash, blue gum, red gum, gray gum, India date palm, Washington and other hardy fan palms, Canary date palm, camphor-tree, athel, *Acacia cyclops*, and *Acacia retinodes*, but only the first three withstand severe freezing weather. The red oak and the red maple are worth testing for these conditions.

The upright character of the Lombardy poplar, redcedar, arbovitae, and the various palms make them suitable for use along roads with very narrow rights of way, but if used too freely the effect would become tiresome.

As healthy, long-lived, large handsome trees are desired for memorial planting, the following are suggested as especially suitable for the different regions. The list gives only a few of the good species available. The nut trees are mentioned for those who desire them, but their planting is usually not recommended for roadsides.

- Region 1. London planetree, English elm, Oregon maple, California walnut.
 2. Oregon maple, madrone, English elm, California walnut.
 3. London planetree, English elm, California white oak, California walnut.
 4. Common locust, London planetree, English elm.

- Region 5. London planetree, California live oak, deodar, California walnut.
 6. Oregon maple, London planetree, English elm, madrone.
 7. Green ash, honeylocust.
 8. Green ash, honeylocust.
 9. Green ash, honeylocust, cottonwood.
 10. Eucalyptus, common locust, Carolina poplar.
 11. Honeylocust, common locust, hackberry.
 12. Green ash, common locust, hackberry.
 13. Green ash, common locust, hackberry, goldenrain-tree.
 14. Green ash, common locust, honeylocust.
 15. Cottonwood, common locust, green ash.
 16. Cottonwood, Chinese elm.
 17. Cottonwood, Jerusalem thorn, Chinese elm, Texas palmetto.
 18. Mossycup oak, Chinese elm, common locust.
 19. Mossycup oak, Chinese elm, honeylocust.
 20. Pecan, Mississippi hackberry, winged elm, honeylocust.
 21. American elm, red oak, blue ash.
 22. American elm, red oak, blue ash, black walnut.
 23. American elm, red oak, blue ash.
 24. White oak, American elm, sugar maple, black walnut.
 25. Red oak, tuliptree, sugar maple, black walnut.
 26. White oak, American elm, red oak, sugar maple.
 27. White oak, red oak, sugar maple, American elm, black walnut.
 28. White oak, red oak, willow oak, black walnut.
 29. Live oak, laurel oak, pecan, willow oak, sweetgum.
 30. Live oak, laurel oak, pecan, sweetgum.
 31. Live oak, silk-oak, southern magnolia, camphor.
 32. Camphor, silk-oak, southern magnolia, royal palm.

DESCRIPTIONS OF ROADSIDE TREES

ACACIA

The species of acacia, often called wattles, are mostly small trees with showy yellow flowers, thriving only in the almost frost-free portion of California and in southern Florida. Although much used in California, many of them are too small to make satisfactory shade trees. They are shallow rooted and stump-sprout badly.

The blackwood acacia³ (*Acacia melanoxylon*), often called Australian blackwood also black wattle, blackwood acacia, or wattle, is a strong, upright tree growing to a height of 75 feet and forming a well-shaped head.

The black wattle (*Acacia decurrens mollis*) is a strong-growing round-headed tree that reaches a height of 40 feet and has dark-green leaves.

Cats-claw (*Acacia greggii*), also known as Texas mimosa, is an evergreen tree or shrub 20 feet high or less, native to dry rocky soils in Texas and New Mexico. It is useful in those places where little else will grow.

The green wattle (*Acacia decurrens*) is a rapid-growing tree, reaching a height of 60 feet and forming a round head with finely cut leaves.

The silver wattle (*Acacia decurrens dealbata*) is much like the black wattle except that its leaves and young branches are covered with a whitish down. At maturity it forms an open head that gives a pleasing and not too dense shade.

AILANTHUS

The ailanthus (*Ailanthus altissima*; also known as *Ailanthus glandulosa*), often called tree-of-heaven, is a tall, broad, handsome tree that is especially valuable near smelters or smoky factories. The staminate and pistillate flowers are borne on separate trees, but only the pistillate trees should be used, as the odor of the blossoms of the staminate trees is very objectionable for about ten days in late spring. These may be produced by grafting from pistillate trees or by propagating from suckers or root cuttings from such trees if they have not been grafted. The tree often root-sprouts freely. The ailanthus may not succeed where there is not freezing weather to check growth for a short period.

³ Illustrations of many of the trees discussed in this bulletin are in *Trees for Town and City Streets*, Farmers' Bulletin 1208, U. S. Department of Agriculture.

ARBORVITAE

The American arborvitae (*Thuja occidentalis*), called by lumbermen northern white cedar, is a columnar cone-bearing evergreen with flattened stems and minute leaves that combine to form fanlike branches of yellowish green. It attains a height of 60 feet and is native to southern Canada, the northern United States, and southward in the Appalachian Mountains to Georgia and westward to Illinois, Minnesota, and Manitoba. It is well adapted to much of the dry western areas where an evergreen is needed to assist the roadside plantings to become windbreaks.

ASH

Several sorts of ash trees are useful for roadside plantings.

The black ash (*Fraxinus nigra*) is native in some of the extreme north-eastern States and in Canada on low cold lands. It grows 60 feet high with a broadly oval top and is useful for roadside planting for some distance west of the Great Lakes.

The blue ash (*Fraxinus quadrangulata*) is native in the northern two-thirds of the Mississippi Valley, attaining a height of 75 feet and growing on high gravelly and limestone soils. It stands alkaline and saline soils and is adapted to roadside planting in the region of its habitat and adjacent sections to the westward.

The European ash (*Fraxinus excelsior*) is a large handsome roundheaded tree growing 80 feet high and more, and is suited to the Pacific slope.

The flowering ash (*Fraxinus ornus*) is a European tree that is especially attractive because of its white flowers. It attains a height of only 25 feet or a little more and will not withstand much cold.

The green ash (*Fraxinus lanceolata*), also called swamp ash and erroneously blue ash, is one of the few successful trees from the Sierra Nevada and Cascade Mountains to the Missouri River and grows well throughout the remainder of the United States, but is of less value than many other trees in the eastern part of the country. It has a broad, round top and grows 50 feet high.

The Oregon ash (*Fraxinus oregona*) is native along the Pacific coast and attains a height of 80 feet with a large oval head. It is useful in its native region.

The red ash (*Fraxinus pennsylvanica*), also sometimes miscalled black ash, is native to the eastern third of the country and westward through Nebraska and Kansas. It grows 50 feet high and is useful in the cool dry regions from the Rocky Mountains eastward.

The velvet ash (*Fraxinus velutina*), native to Arizona, New Mexico, and Texas, attains a height of 75 feet under cultivation, although only 40 feet when growing wild. It has compound willowlike leaves on drooping branches, making a pleasing but not too dense shade. It withstands considerable alkali and other adverse conditions, though little cold, so that it is well adapted for much of the southwestern United States.

The white ash (*Fraxinus americana*) is a large oval-headed tree growing to more than 80 feet in height, reasonably satisfactory on rich lands east of the Missouri River.

BASSWOOD

This valuable tree for roadside planting is discussed under American linden.

BEECH

The American beech (*Fagus grandifolia*), called by lumbermen beech, is among our largest roadside trees, attaining a height of more than 80 feet, with a broad symmetrical top. It is native to the eastern United States and is useful for roadside planting throughout that region. Its smooth blue-gray bark is especially attractive, but it is usually scarred by the ever-present whittler, who seems to be unable to resist the temptation to disfigure the trunk of this beautiful tree.

The European beech (*Fagus sylvatica*) is usually smaller in every way than the American beech, but can be used in practically the same territory.

BEEFWOOD

The beefwoods (*Casuarina* spp., sometimes called Australian pines; fig. 3), are peculiar in appearance, having slender cylindrical or angled branches

without leaves. They thrive on light lands with little water under alkali and saline conditions and are therefore good on sand dunes close to the ocean where many other plants will not succeed. They will not stand much frost.

The Cunningham beefwood (*Casuarina cunninghamiana*), sometimes called hardy Australian pine, is relatively hardy and will succeed in the peninsula of Florida and most of the southern half of California.

The horsetail beefwood (*Casuarina equisetifolia*) ultimately attains a large size. It is tender to cold, but is the species most grown in southern Florida and southern California.

The she-oak (*Casuarina stricta*) grows 35 feet tall under favorable conditions and, like the other beefwoods, should be used where conditions are unfavorable to the growth of trees with more foliage.



FIG. 3.—Beefwood, or casuarina

BIRCH

The birches are natives of and especially useful in the States along the Canadian border from Minnesota eastward, although some of them are indigenous west to the Pacific coast. They have small leaves with slender graceful branches and conspicuous bark that often loosens in large flakes.

The canoe birch (*Betula papyrifera*), the paper birch of lumbermen, sometimes called American white birch, is a large, tall, showy tree with white bark but is not well adapted to dry situations.

The sweet birch (*Betula lenta*), sometimes called cherry birch or black birch, attains a height of 60 feet or more and has dark reddish brown bark.

The yellow birch (*Betula lutea*) makes a large tree, sometimes 100 feet high, with silvery bark, becoming yellow on old trees.

BOTTLETREE

Bottletrees are natives of Australia and are adapted to warm regions.

The black kurrajong (*Brachychiton populneum*), also known as Victorian bottletree, is a tall tree with bright glossy leaves of many different forms and is useful in the warmer parts of California.

The Chinese parasoltree (*Firmiana simplex*, also known as *Sterculia platani-folia*; fig. 4), sometimes called Japanese varnish tree, is a handsome small roundheaded deciduous tree with good foliage that can be grown from Washington southward and in California. It is quite common in Georgia and Florida.

The flame tree (*Brachychiton acerifolium*) grows 60 feet high, with a sturdy habit, has deeply lobed leaves and showy scarlet flowers, and thrives in either dry or fairly moist places in the warmer parts of California.

BUCKTHORN

The cascara buckthorn (*Rhamnus purshiana*), commonly known as cascara, is a small deciduous tree or large shrub with handsome foliage, sometimes attaining a height of 40 feet. It is most desirable in its native habitat, the Pacific Northwest.

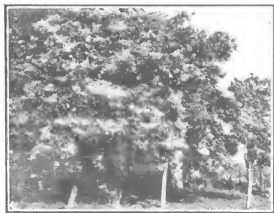


FIG. 4.—Chinese parasoltree, or *sterculia*



FIG. 5.—Camphor-tree

CAMPHOR-TREE

The camphor-tree (*Cinnamomum camphora*; fig. 5) is a medium-sized, compact, handsome, oval-headed evergreen that will succeed in regions sufficiently warm for the orange. Where it can be successfully grown, it is deservedly popular.

CAROB

The carob (*Ceratonia siliqua*) is a handsome evergreen tree growing to a height of 40 feet or more. It is likely to succeed wherever the orange thrives.

CATALPA

The common catalpa (*Catalpa bignonioides*), sometimes known as Indian bean, is a rapid-growing spreading tree, attaining a height of 40 feet, with large leaves and large trusses of white or yellowish flowers in early summer, making most showy specimens. It needs rather rich moist soil and is adapted to the regions east of the dry-land country, except near the Canadian border.

The western catalpa (*Catalpa speciosa*), called by lumbermen hardy catalpa, is a rapid-growing tree attaining a height of 80 feet, with large leaves and upright bunches of large, almost white flowers in early summer, followed by long beans that hold most of the winter. It is useful westward to the dry-farming areas.

CEDAR

The name cedar is applied to several distinct groups. In addition to those discussed in this section, the arborvitae is often called "white cedar" and some of the junipers "redcedar."

The Atlas cedar (*Cedrus atlantica*) is a handsome tree which is not quite so hardy as the cedar of Lebanon.

The California incense-cedar (*Libocedrus decurrens*), or incense-cedar of lumbermen, native from Oregon to southern California, is a coniferous evergreen attaining a height of almost 100 feet in its native habitat, with slender branches forming a narrow, almost feathery head. It is hardy in the east as far north as Philadelphia and Cincinnati.

The cedar of Lebanon (*Cedrus libanotica*, formerly *Cedrus libani*) will thrive even as far north as New York and Cincinnati and is a handsome tree.

The deodar (*Cedrus deodara*), or Himalayan cedar, is a handsome evergreen roadside tree for the southern half of California, Florida, and the warmer parts of the southeastern United States.

CHERRY

The black cherry (*Prunus serotina*) is native over the eastern half of the United States and makes a handsome roadside tree with its medium-sized, bright-green leaves, an oval top attaining a height of 70 feet or more, drooping clusters of small white flowers just after the leaves appear, and similar drooping clusters of small black cherries in early fall.

CHESTNUT

Although the native American chestnut (*Castanea dentata*), called by lumbermen chestnut, is a handsome tree, on account of the bark disease it should not be planted anywhere east of the Rocky Mountains, but planting may well be considered for Puget Sound and adjoining regions. Some of the forms of the Spanish chestnut (*Castanea sativa*) are handsome and make satisfactory roadside trees where the bark disease is not prevalent.

CHINABERRY

The chinaberry (*Melia azedarach*), sometimes known as the China tree, is a small roundheaded short-lived tree growing where there is seldom more than 10 degrees of frost. It is too short lived to be considered for planting where other trees will grow.

The Texas umbrella-tree (*Melia azedarach umbraculiformis*), called by foresters umbrella chinaberry, is a small compact form of the chinaberry with an umbrella-shaped top. It is useful for formal effects where the thermometer does not go below 20° F.

CYPRESS

The Arizona cypress (*Cupressus arizonica*) is native to Arizona and Mexico and is useful in those regions and others with similar climatic conditions. It is a coniferous evergreen growing more than 30 feet high, sometimes with a broad open top and again as a narrow pyramid. It will stand quite considerable cold and drought.

The baldcypress (*Taxodium distichum*; fig. 6), called by lumbermen southern cypress (also sometimes called deciduous cypress), is a tall, conical, deciduous cone-bearing tree with the trunk buttressed at the base. It is native near the coast on rich bottom lands from Delaware to Texas and is a handsome roadside tree for these sections.

The Guadalupe cypress (*Cupressus guadalupensis*), the Tecate cypress of lumbermen, or blue cypress, reaches a height of 70 feet, and in southern California seems to do well on dry locations but will not stand much frost.

The Italian cypress (*Cupressus sempervirens*) is naturally a columnar tree that reaches a height of 70 feet, but loses its characteristic form with too much fertility and moisture and becomes more spreading by the drooping of the branches. It is chiefly useful for formal effects in the drier regions.

The Monterey cypress (*Cupressus macrocarpa*; fig. 7) forms a broad spreading head, though more often seen kept under the shears as a hedge or in formal designs. It is useful in dry situations in the warmer parts of California.

The smooth cypress (*Cupressus glabra*) is a medium-sized cone-bearing evergreen suited to dry hot regions.

ELM

The elms are large handsome shade trees suitable for use over a wide range of territory.

The American elm (*Ulmus americana*), sometimes called the white elm and water elm, is one of the handsomest American trees. It has given to New England roadsides and village streets the characteristic appearance so attractive to summer visitors. It is tall and spreading and, where planted as near together as is customary on country roads, the effect of the mature trees is that of an arch formed by the growing together of their spreading tops. It is of rapid growth and long lived.

This elm drops its leaves very early in the fall, but comes into leaf early in the spring. Because of its manner of branching it is especially liable to be split by heavy winds. This danger may be lessened by selecting and planting specimens with a close, compact habit of growth.

Because of the attacks of the elm leaf-beetle⁴ and the European elm bark louse,⁵ many handsome trees have been severely damaged or killed before communities were properly equipped for fighting them, but with careful spraying these insects may be kept in check. However, on account of the existence of these pests and because they are gradually spreading to new territory, tree planters should consider carefully the advisability of planting the elm in their localities. Where there is no danger from these insects it is one of the best roadside trees. Consultation with the nearest State agricultural experiment station or with the Entomologist of the United States Department of Agriculture is advisable in order to determine this point.

The best specimens are to be found in New England, northern New York, and Michigan, although the elm is being grown all over the United States and is proving a valuable tree even in regions where the rainfall is as low as 15 inches. It is not recommended for planting in dry hot sections.

The cedar elm (*Ulmus crassifolia*) is a large spreading tree, successful in the warm parts of the country even on the drier land.

The Chinese elm (*Ulmus pumila*) is a large, spreading, rapid growing tree (fig. 8), especially promising for the dried regions of the western half of the country.

The English elm (*Ulmus campestris*) is a tall oval-headed compact handsome tree with leaves smaller than the American elm, which stay on much later



FIG. 6.—Baldcypress

⁴ *Galerucella xanthomelaena* Schr. (Data regarding insects furnished by the Bureau of Entomology.)

⁵ *Gossyparia spuria* Mod.

in the fall. It is at its best in the Puget Sound region, equaling the American elm and excelling it in the interior valleys of California. It also thrives in the northeastern quarter of the United States.

The Huntingdon elm (*Ulmus hollandica vegeta*) is a comparatively round-headed European variety. It is a large handsome tree with good foliage and is more compact in growth than the American elm. It succeeds well on the Pacific slope.

The Scotch elm (*Ulmus glabra*), sometimes called "wych elm," is a tree over 80 feet tall with an oblong top without suckers and having a smooth bark. It is especially useful in the colder, drier parts of the country, although desirable wherever the American elm will grow.

The slippery elm (*Ulmus fulva*), sometimes called "red elm," has spreading branches with a broad, open, flat top attaining a height of 60 feet. It is particularly useful east of the dry-farming areas, where the species available are somewhat limited.

The winged elm (*Ulmus alata*), sometimes called "wahoo," is native to the South Atlantic and Gulf States and to southern Illinois, Missouri, and



FIG. 7.—Monterey cypress

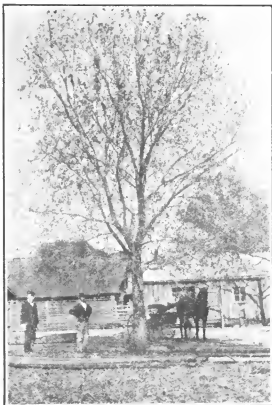


FIG. 8.—Chinese elm

Oklahoma. It has smaller leaves than the American elm and is not so spreading in its growth. It succeeds well in the southeastern quarter of the country.

EUCALYPTUS

There are a large number of species of Eucalyptus, many of which can be used for roadside planting in the southern part of California. They are also being planted in southern Florida, but on account of the moist climate it is not to be expected that they will succeed as well as other kinds. They are tall handsome quick-growing trees, usually bearing two kinds of leaves at some time during their development.

The roots of these trees, as well as those of poplars, willows, elms, and some of the maples, are apt to give trouble in the vicinity of poorly built sewers because of roots entering defects and filling the interior.

The blue gum (*Eucalyptus globulus*) is one of the best eucalypts and the one most commonly used in California. It is tall, globular headed, handsome, and will survive several degrees of frost, but it can not withstand the heat of the deserts in region 10.

The desert gum (*Eucalyptus rudis*) is most resistant to heat and cold, and it makes a handsome roadside tree. Its pendent branches have a tendency

to severe splitting with age, but with early attention this may be largely overcome, and it may prove especially valuable for region 10.

The gray gum (*Eucalyptus tereticornis*), sometimes called forest gray gum or flodded gum, grows with a regular rounded head to a height of more than 100 feet and with the sugar gum is probably the most drought resistant of the eucalypts. It will stand as much variation in temperature, soil, and moisture as the red gum and more cold than the blue gum.

Lemon gum, often called lemon-scented gum (*Eucalyptus maculata citriodora*), has an erect habit with drooping branches growing 80 feet or more, with smooth whitish bark and lighter patches and lemon-scented foliage. It is a handsome tree for the frost-free sections.

The manna gum (*Eucalyptus viminalis*) is another Eucalyptus which withstands several degrees of frost and makes an excellent roadside tree (fig. 9). Some forms shed their bark in long bands that leave the trunks almost white, thus making a striking appearance but often causing it to be considered a dirty tree.

The Port Gregory gum (*Eucalyptus calophylla*), sometimes erroneously called "spotted gum," is a very ornamental tree of moderate size, with dark-green glossy foliage and large white flowers. It is adapted to the coast regions of southern California and would probably do well in southern Florida.

The redbox (*Eucalyptus polyanthemus*), sometimes called Australian beech, is a small tree, although occasionally it becomes tall. It is valuable because of its spreading habit, silvery foliage, and abundance of white flowers. It is a drought and heat resistant species as well as enduring temperatures as low as 20° or even 15° F.

The red gum (*Eucalyptus longirostris*; by many called *Eucalyptus rostrata*), grows with a broad head and is one of the most resistant of the eucalypts to frost, drought, alkali, and heat. It succeeds wherever eucalypts can be grown, but it is most useful in the hot southern desert in California.

The sugar gum (*Eucalyptus cladocalyx*; also known as *Eucalyptus corynocalyx*) is a drought-resistant variety, withstanding some cold, that is frequently used as a roadside tree in southern California.

The swamp mahogany (*Eucalyptus robusta*) is a much-branched tree of moderate height with an abundance of bloom, but it is rather brittle. Although it thrives in the interior valleys of California, it is best adapted to the coast regions and may prove valuable for the nearly frost-free portions of the coast of the Gulf of Mexico.



FIG. 9.—Manna gums (*Eucalyptus viminalis*)

GINKGO

The ginkgo (*Ginkgo biloba*), or maidenhair-tree, is a native of China and Japan that thrives either in a cool climate or a hot moist one and succeeds on the Pacific coast and east of the Mississippi River. It is extremely erratic in its behavior, frequently growing well, sometimes practically not growing at all; but where it thrives it is very disease resistant and withstands severe windstorms remarkably well. The leaf is peculiar in outline, resembling a much-enlarged segment of a frond of maidenhair fern with a corrugated surface. The tree is conical when young, but as it reaches maturity its top usually fills out, making a broad, almost flat-topped handsome tree. Only the staminate form should be used, because the pistillate form bears fruits the flesh of which is ill-smelling, slippery, and dangerous when it drops to the ground and to some is somewhat poisonous to the touch. Ginkgo trees, therefore, need to be propagated by budding or grafting from the mature staminate form.

Because of its distinctive appearance, the ginkgo does not harmonize with our native trees and can probably be used only in formal plantings or where a point of emphasis is needed.

GOLDENRAIN-TREE

The goldenrain-tree (*Koelreuteria paniculata*; fig. 10) is a roundheaded, somewhat open tree, growing 40 feet high, with compound leaves composed of fine leaflets that give it a soft fernlike appearance and with an abundance of yellow flowers in summer. It is native to China, Chosen (Korea), and Japan, and because it stands drought and heat as well as cold it is being used in Kansas, Colorado, and southward in addition to the Pacific coast and east of the Mississippi.

HACKBERRY

The hackberry (*Celtis occidentalis*) is especially valuable from the Sierra Nevada and Cascade Mountains eastward through the regions of little rainfall, where it grows satisfactorily. It is also much used in the more humid Eastern States where many better trees thrive. It is of moderate size with an oblong head of rather open growth and has a comparatively short life. Its leaves are much like those of the elm.



FIG. 10.—Goldenrain-tree, or *Koelreuteria*

The tree is sometimes affected by a fungus known as witches'-broom. This causes large numbers of small sprouts to start from the affected portion, which gives the infected tree an unsightly appearance. The hackberry should not be planted where this disease is prevalent.

The sugarberry (*Celtis laciniata*, formerly *Celtis mississippiensis*), sometimes called Mississippi hackberry, is a medium-sized, open oblong-headed tree with smoother leaves than the common hackberry. It is useful in the warmer parts of the dry regions that are subject to some freezing weather, and to some extent in the more moist sections with similar temperature ranges farther east. The trunk and large branches have little wartlike projections of the bark scattered irregularly over them. The small twigs are sometimes more or less spotted or winged in the same way. The tree is smaller than the common hackberry and apparently is less subject to witches'-broom.

The name "sugarberry" comes from the sweet purple, orange, or almost black berries that are borne in the early fall.

HEMLOCK

The Canada hemlock (*Tsuga canadensis*), called by lumbermen eastern hemlock, is a native evergreen of wide pyramidal top 70 feet high, with gracefully drooping branches clothed with short dark-green needles marked with a white line. It is especially useful near the Canadian line, west to Wisconsin.

HICKORY

Several of the hickories are among the handsomest hardwood trees for roadside planting, but they are more difficult to transplant than most others. Where saplings volunteer, where nuts can be planted and protected, or where the necessary attention can be given them they will succeed through much of the eastern part of the country.

The pecan (*Hicoria pecan*) is one of the handsomest of the hickories. Trees of this variety for transplanting are more available in nurseries than the other hickories and may be a trifle more readily transplanted. In the southeastern quarter of the United States this hickory may often be found along the roads, and when thus growing it is certainly worthy of being protected.

The shagbark hickory (*Hicoria ovata*) is a large handsome tree with oval top and bark that sheds in long broad flakes that long hold to the tree from their upper end, giving it a shaggy appearance. It is native to and useful in the eastern part of the United States except near the South Atlantic and Gulf coasts.

The mockernut (*Hicoria alba*), called by lumbermen mockernut hickory, is a handsome broad-headed tree with rough gray bark, native from southern New Hampshire to eastern Kansas and southward with the exception of southern Florida.

The pignut (*Hicoria glabra*), called by lumbermen pignut hickory, is a large oval-headed tree, native from Iowa eastward and southward except in Maine and southern Florida. It inhabits uplands and ridges in abundance in the Northern States.

HOLLY

The American holly (*Ilex opaca*), the holly of lumbermen, a broadleaf evergreen of pyramidal form growing 50 feet high in the southeastern quarter of the United States, is a handsome tree, with its stiff, bristly, dark-green leaves and brilliant scarlet berries in winter. There will be great danger of its being badly mutilated for Christmas decorations until the public is educated from such vandalism.

HONEYLOCUST

The honeylocust (*Gleditsia triacanthos*) is a large open roundheaded fine-foliated tree, admitting much light through its top. The common form has stiff spines 2 to 6 inches long or even longer, and there is also one without spines which should be used for planting. It is a useful tree on the Pacific slope and in the eastern half of the United States, except in the warm sections close to the South Atlantic and Gulf of Mexico coasts and near the Mexican border. It is especially useful in the drier regions from the Sierra Nevada and Cascade Mountains eastward to the Missouri River and eastern Texas.

HORNBEAM

The American hornbeam (*Carpinus caroliniana*), or blue beech of lumbermen, sometimes called hornbeam and ironwood, forms a broad bushy tree 30 feet high, with dark bluish green foliage that turns scarlet and orange yellow in the fall. It is native to the eastern half of the United States, and although the tree is found wild in rather moist situations it is especially useful in the colder sections and on dry banks or in other dry locations.

JACARANDA

The jacaranda (*Jacaranda mimosaeifolia*; also known as *Jacaranda ovalifolia*) is naturally a straggling, irregular tree that attains a height of 40 feet or more, with large showy blue flowers in profusion in early summer and finely cut foliage that is almost evergreen. It is only adapted to the practically frost-free regions.

JERUSALEM THORN

The Jerusalem thorn (*Parkinsonia aculeata*), called by foresters horse bean and known as paloverde, in southern Texas as bigota, and in Arizona as ratama, is a small tree or bush with feathery foliage and drooping yellow flowers useful in the dry frost-free regions of the Southwest.

JUNIPER

Junipers are cone-bearing evergreens, many of them dwarf and a few of them prostrate ground covers suitable for road banks. There are three that are useful as roadside trees.

The Colorado juniper (*Juniperus scopulorum*), called by lumbermen Rocky Mountain redcedar, is a close relative of the redcedar, is native to the Rocky Mountains and westward, and forms a broad head often with several branches or trunks.

The redcedar (*Juniperus virginiana*; fig. 11), called by foresters eastern redcedar, often called Virginia redcedar, is native over the eastern half of the United States except in the neighborhood of Florida and is a desirable

columnar evergreen, in the wild sometimes attaining a height of 80 feet or more. It should not be used in apple-growing regions, as it is a host for the apple-seab fungus.

The western reedcedar (*Juniperus occidentalis*) is native from Washington to California, where it sometimes attains a height of 60 feet. It is desirable for its native habitat and near-by regions.

KENTUCKY COFFEETREE

The Kentucky coffeetree (*Gymnocladus dioica*), called by lumbermen coffeetree and often called mahogany, is a rugged open-headed tree of more than 70 feet in height, with large coarse branches and compound leaves. It is native to the rich lands of the Mississippi and Ohio Valleys and is useful there and in the surrounding territory that is not too dry.

LARCH

The American larch (*Larix laricina*), or the "tamarack" of lumbermen, also called "hackmatack," is a deciduous cone-bearing tree with light-green foliage and tall columnar form, native to Canada and south to Pennsylvania and Illinois. It is useful in the colder parts of the country, where it thrives on the higher ground, but farther south it is found in low wet land.

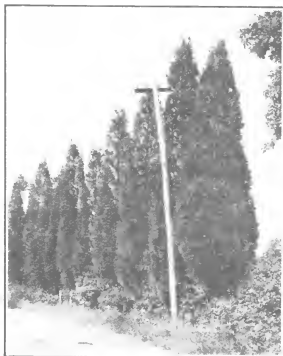


FIG. 11.—Redcedars

LINDEN

The American linden (*Tilia americana*), called by lumbermen "basswood" (fig. 12), is a large round-headed tree much admired for the dark upper surface and the lighter under surface of the leaves and its sweet-scented blossoms in early summer. It is native from Nova Scotia to Manitoba and south to Alabama and Texas. It is excellent for roadside planting, especially in moist retentive soils.

Its planting is urged by beekeepers, and in fruit regions it may be especially desirable to prolong the season of abundant food for the bees needed to pollinize the fruit. It is adapted to the Pacific coast and eastern United States with the exception of the warmest sections.

The common linden (*Tilia europea*, also called *Tilia vulgaris*) is supposed to be a natural hybrid. It makes a large tree and is one of the best lindens for ornamental planting.

The bigleaf linden (*Tilia platyphyllos*), often called European linden and Dutch linden, has smaller leaves than the American linden and more contrast between its upper and lower surfaces. It differs but little in size, is more compact in growth, and holds its leaves longer in the fall. It is a useful tree for planting in most of the regions adapted to the basswood, though it does not resist drought as well as the common linden.

LOCUST

The common locust (*Robinia pseudoacacia*), called by lumbermen "black locust" (fig. 13), is one of the desirable trees from the Sierra Nevada and Cascade Mountains to the humid country of the east, as it withstands drought splendidly. It thrives in the Puget Sound region, in parts of the country where there is severe freezing weather each winter and grows well even in the valleys of California, although here the pods hold for several years and become very unsightly unless knocked off. Its roots and shade seem not to injure crops on adjoining land, as sometimes happens with other trees.

This tree makes a moderate-sized oval head that bears sweet-scented white flowers in late spring or early summer. Its greatest drawback is its liability to serious injury and disfigurement by the locust borer (*Cyrtene robiniae* Forst.),⁶ but with proper care this can be prevented.⁷ In some parts of the East it is also subject to a leaf miner (*Chalepus dorsalis* Thunb.), giving its foliage a burned appearance.

MADRONE

The madrone (*Arbutus menziesi*), called in the forest list madrono, is native to the Sierra Nevada and Cascade Mountains, grows 80 feet or more high, with an open sprawling habit, and has reddish brown bark. It is a showy tree worthy of extended cultivation, but so far is little used. It does best in a well-drained soil and will not stand dry winds or many degrees of frost.

MAGNOLIA

The magnolias here considered are large handsome trees, usually with long oval tops, some evergreen and some deciduous, but all have large fleshy roots that require very careful handling when transplanted. For this reason they are best moved in early spring,



FIG. 12.—American lindens, or basswood, planted too closely



FIG. 13.—Common locust

even the deciduous varieties, preferably with a ball of earth, like evergreens.

The bigleaf magnolia (*Magnolia macrophylla*) grows to a height of 50 feet, but is conspicuous because of its mammoth leaves, many of which are 2 feet long. In late spring it has immense white flowers 10 inches in diameter. It is native from North Carolina to Florida and Louisiana and is useful for planting in that territory.

The cucumbertree (*Magnolia acuminata*), called by foresters cucumber magnolia, with its large light-green deciduous leaves and handsome form is an imposing tree in the eastern United States.

The southern magnolia (*Magnolia grandiflora*), called by foresters evergreen magnolia, is a good evergreen tree, adapted only to regions where it is not too dry and where the temperature seldom falls to zero. It thrives from Washington, Cincinnati, and St. Louis southward and along the Pacific coast except southeastern California. It grows to be a large oval-headed tree and bears beautiful large white blossoms in late spring or early summer.

MAPLE

Among the maples are some undesirable trees much used for planting and others valuable only in restricted areas or under special conditions. They are not so satisfactory for planting as has been supposed.

⁶ Data furnished by the Bureau of Entomology.

⁷ Craighead, F. C. Protection from the locust borer. U. S. Dept. Agr. Bul. 787, 12 p., illus. 1919. Out of print, but may be consulted in libraries.

The black maple (*Acer nigrum*), is similar to the sugar maple, but has larger, thicker, darker, duller leaves with drooping sides, darker bark, and more open form. It is a handsome tree, useful in the regions where the sugar maple grows.

The boxelder (*Acer negundo*), or ashleaf maple, with several varieties, is native to all parts of the country east of the Rocky Mountains, except near the South Atlantic and Gulf coasts. It is a small quick-growing tree, thriving almost anywhere, but it reaches maturity early. Because of its early decay and liability to destruction by wind it should not be used where other trees succeed. There may be conditions requiring the use of this tree between the Sierra Nevada and Cascade Mountains and the Missouri River and eastern Texas, but it should be grown only when other trees suggested for these regions will not succeed.

The hedge maple (*Acer campestre*), sometimes called English maple, is small and roundheaded, with small dark-green leaves, useful in Washington, Oregon, and much of California.

The Norway maple (*Acer platanoides*) is roundheaded and eventually reaches large size, but compared with most of the other maples it is slow growing



FIG. 14.—Norway maples

(fig. 14), forming a low thickly branched head with heavy and dark-green foliage, permitting but little light to pass through.

This tree is subject to a wilt⁸ that has recently killed many trees in Virginia and near-by sections. It is also attacked by a leaf aphid (*Periphyllus tyropictus* Kess)⁹ which produces yellow spots on the leaves, causing them to drop prematurely. Also, the honeydew which they produce so abundantly at times covers the leaves and wets the ground beneath the tree, which under certain weather conditions causes the leaves to become blackened with accumulating dust and a fungus to grow in the secretion, thereby giving the tree an unsightly appearance. However, this aphid is not always present and does not seriously injure the tree.

The Norway maple comes into leaf later than most of the other maples, but holds the leaves later in the fall. They assume a bright-yellow hue before they drop. The leaves are preceded by an abundance of yellow-green blossoms, and the shape of the tree and its attractive dark-green foliage make it popular in spite of its dense low head. It will succeed on the Pacific slope and east of the Missouri River.

⁸ Data furnished by the Office of Forest Pathology.

⁹ Data furnished by the Bureau of Entomology.

The Oregon maple (*Acer macrophyllum*), called by lumbermen bigleaf maple, is the large-leaf maple of the Pacific slope. It forms a large round head, which with its unusually large dark-green leaves makes a very attractive tree that succeeds well on the Pacific slope. It is valuable and worthy of more extended cultivation.

The red maple (*Acer rubrum*), also called scarlet maple or swamp maple, is one of the most widely distributed of American trees. It is found from Canada to the Gulf of Mexico and west to Minnesota and eastern Texas. Its leaves are the smallest of any of the eastern native maples, but its growth is large and of rather upright outlines. It is one of the few trees succeeding well near the ocean. It has bright-red blossoms before the leaves appear, and the young leaves and fruits are also red. The mature leaves begin to color early, some branches assuming brilliant reds and yellows as early as the middle of July and staying on later than those of the sugar maple. The red maple is a handsome tree that is not so much used as it deserves to be in the Puget Sound region and in moist situations eastward from the Rocky Mountains.

The Rocky Mountain maple (*Acer glabrum*), called by foresters dwarf maple, is a small shrublike tree with graceful shiny foliage. It attains a height of 25 feet and is useful in the western third of the country.

The silver maple (*Acer saccharinum*), also called soft maple and white maple, is probably more used for planting throughout the United States than any other tree, but is one of the least desirable of the maples. It is usually planted because it is a quick-growing tree, but it is no more so than several other much better trees. Serious objections to its use are its brittle wood, which at an early age is easily broken by ordinary windstorms, causing it to become unsightly when comparatively young, its shallow rooting, and its tendency to decay. The tips of the limbs frequently die, leaving the whole top of the tree bare of leaves, and the wood decays quickly if the bark is broken. It does not stand pruning so well as most other trees, and except the Carolina poplar it probably has been pruned more ruthlessly than any other. It should never be severely "headed back" or, as it is popularly called, "dehorned," because the stubs seldom heal over, causing decay which in a very few years will rot the center of the limbs and trunk, thus destroying the tree. It forms a large round head with an open top, and its foliage, pale green above and almost white beneath, makes a very delightful shade.

The striped maple (*Acer pennsylvanicum*), or moosewood, is native in the Appalachian Mountains northward and westward along the Great Lakes. It is a small round-topped tree, attaining a height of 30 to 40 feet and useful for planting in the regions where it is native.

The sugar maple (*Acer saccharum*; see the title-page illustration), often called hard maple, is especially adapted to gravelly soils in the cooler parts of the Pacific slope and the northeastern United States. It is oval-headed, large, and handsome, having red blossoms which individually are inconspicuous but in mass are showy early in the spring before the leaves appear. The leaves come early, but in late summer they begin to turn brilliant yellow and red and drop before most other leaves. The sugar maple is an especially handsome tree for soils to which it is adapted, but unfortunately it is subject to a wilt that has killed many trees in Virginia and near-by regions.

Although the sycamore maple (*Acer pseudoplatanus*) is similar in appearance to the Norway maple, it is not a satisfactory tree in the eastern United States, although it succeeds on the Pacific slope.

MESQUITE

The mesquite (*Prosopis glandulosa*) is a native of the warmer sections of the southwestern part of the country. Under favorable conditions it will make a tree 60 feet high, but ordinarily it is not much more than a bush. It is handsome and useful in the warmer parts of the dry country.

MULBERRY

The mulberries are small trees that may be found useful in dry climates or on poor or gravelly soil and to provide food for birds. Damage to cherries and other fruits may be lessened by having these trees near.

The paper-mulberry (*Papyrius papyrifera*; also known as *Broussonetia papyrifera*) sometimes grows where better trees do not thrive, but it will not stand very low temperatures.

The red mulberry (*Morus rubra*) is useful in dry, cold situations where better trees do not succeed but is not so hardy as the Russian mulberry.

The Russian mulberry (*Morus alba tatarica*) is very hardy and can be used under cold, dry conditions where few other trees survive. It should only be planted where better trees succumb.

The white mulberry (*Morus alba*) is another form used in the southwestern part of the country and northward that will stand cold except under the most extreme conditions.

OAK

Of the trees available for roadside planting, the oaks are the most desirable. Although some of the handsomest species, such as the white oak and the live oak, are slow growers, others, like the red oak, are rapid growing. The white oak and sugar maple observed in Raleigh, N. C., and shown as Figure 17 in Farmers' Bulletin 1208, U. S. Department of Agriculture, are each 32 years old, and although differing in shape are practically the same size; yet the sugar maple is considered a sufficiently rapid growing tree to be planted frequently, while the white oak is seldom planted. In the drier parts of the country, oaks are of slower growth than in the more humid sections and never attain the size of the same species under more favorable conditions, but they are worthy of planting because ultimately they make fine trees. They are hardy, most of them are long lived, and for the most part there are comparatively few diseases and insects that seriously attack them. Some of the southern species are subject to the attacks of mistletoe. With the exception of those species characteristic of the Southeastern States the oaks are not so readily transplanted as many other trees, so that special care should be used, including very severe pruning at the time of moving.

The black oak (*Quercus velutina*) is a large oval-headed native tree with large bright lustrous green leaves that turn dull red and orange. It is much like the red oak but not so handsome and thrives even on dry soils.

The blackjack oak (*Quercus marilandica*) is a tree more than 30 feet high, with a broad top and dark shiny green leaves clustered at the ends of the branches. It thrives in dry or sandy land not adapted to many of the larger oaks.

The California live oak (*Quercus agrifolia*), known to lumbermen as coast live oak, is an evergreen suitable for use on the California coast from San Francisco southward and succeeds on the ocean front. It is easily transplanted if handled young, and especially so when planted from pots.

The California white oak (*Quercus lobata*), known to lumbermen as valley oak, is a beautiful tree for the Sacramento and San Joaquin Valleys and southward. When transplanted young, especially if taken from a pot, it is easily established where there is opportunity to water it for a few years.

The chestnut oak (*Quercus montana*; formerly *Quercus prinus*) is a native of gravelly soils on eastern mountains and thrives in the eastern part of the country on similar soils. It is a large handsome tree.

The chinquapin oak (*Quercus muhlenbergi*), also known as yellow chestnut oak, has an oblong or oval top of more than 60 feet, with leaves similar to those of the chestnut, having toothed edges, glossy green above and silvery white beneath, the bark being light gray. It is especially adapted to the Mississippi Valley.

The cork oak (*Quercus suber*) is a small round-topped evergreen suitable for use in the warmer parts of the country. It is the tree from which the cork of commerce is obtained.

The Darlington oak is a form of laurel oak (*Quercus laurifolia*) especially desirable for ornamental planting. It is large, roundheaded, with leaves a trifle smaller and not quite so nearly evergreen as the laurel oak. It is found wild about Darlington, S. C., where a good form of the laurel oak appears to have been introduced as a shade tree in the early part of the nineteenth century. Its range of usefulness is from the Atlantic and Gulf coasts to the edge of the Piedmont region except that it does not thrive in southern Florida.

The Emory oak (*Quercus emoryi*) is a native evergreen of the southern Rocky Mountains and would be a promising tree for the adjacent territory.

The English oak (*Quercus robur*) forms a round top with small gray-green leaves and seems most at home in the Pacific Northwest.

The laurel oak (*Quercus laurifolia*) is a large oval-headed tree, not so rugged and irregular as the live oak, but is suitable for planting in the sand-hill and coastal-plain regions. It has large thick glossy leaves, and in the

warmer regions it is practically evergreen. It is readily transplanted, but is not so common in the woods or used so much as the willow oak and the water oak.

The live oak (*Quercus virginiana*; fig. 15) is probably the noblest and most majestic of the oaks of the Southern States. Being an evergreen of slow growth, it is sufficiently open headed to make a good roadside tree, and wherever found it is the pride of the people. When it becomes old it is spreading and usually does not form so high a head as the willow oak and the laurel oak. Compared with other southern oaks it is difficult to transplant, but is of sufficient merit to be largely used, especially where the future as well as the present is to be considered.

The mossycup oak (*Quercus macrocarpa*), known to lumbermen as bur oak, is native in the northeastern United States and west of the Mississippi River, on the hills lying between the river bottom and the prairies west to the western parts of the Dakotas and Nebraska, and central Kansas and Texas. It is a large handsome tree that should prove satisfactory on fertile well-watered soils.



FIG. 15.—Live oaks

The overcup oak (*Quercus lyrata*), or swamp post oak, is a large handsome tree native primarily to moist lands, but useful in much of the warmer sections of the country.

The pin oak (*Quercus palustris*), sometimes called the "swamp oak," is a tall tree, conical when young, oval at maturity, with a drooping habit of the lower branches. The leaves are quite finely divided and are a bright glossy green. The tree comes into leaf late in the spring and holds its foliage late in the fall, many of the dead leaves hanging on through the winter. It is not so spreading as the red oak. Because of the tendency of the limbs to droop, particularly as they get older, it is desirable that a good strong leader should be developed, so that the lower limbs may be removed from time to time as conditions require. The pin oak thrives on wet and heavy clay soils as well as on a wide range of other soils and is adapted to the Pacific slope and most of the eastern half of the country.

The post oak (*Quercus stellata*) forms a large round head under favorable conditions, is especially adapted to poor, dry soils, but does not grow so far north as some of the other oaks.

The common red oak (*Quercus borealis maxima*, formerly *Quercus rubra*; fig. 16), known to lumbermen as red oak, is probably the best tree in the eastern United States (except Florida), the Puget Sound region, and south-

ward along the coast to San Francisco, as well as being promising for much of the cooler portions of the intermediate country. It is a large oval open-headed tree of rapid growth, as under good conditions a young red oak will grow 4 feet in a single season. Like the other oaks it is slow in coming into leaf in the spring, but holds its foliage late in the fall, the leaves usually turning a brilliant red before they drop. It is comparatively free from insect and fungous attacks, and because it thrives on sandy lands only a few feet above high tide or within the reach of ocean spray it is one of the few trees really suitable for planting close to the ocean.

The scarlet oak (*Quercus coccinea*) is a large open roundheaded tree with leaves more deeply divided than those of the red oak. As its name indicates, the leaves turn a brilliant scarlet in autumn, being even more gorgeously than the red oak. This tree is adapted for planting near Puget Sound and in the northeastern United States.

The shingle oak (*Quercus imbricaria*) forms a medium-sized oval top with large dark-green thick smooth-edged leaves and is found native on rich lands from Kansas eastward almost to the Atlantic Ocean.

The southern red oak (*Quercus rubra*, formerly *Quercus falcata* and having certain forms separated by some botanists as *Quercus pagodafolia*), formerly Spanish oak and swamp Spanish oak, is adapted to the southeastern part of the country. It is larger than the red oak and similar to it.

The swamp chestnut oak (*Quercus prinus*, formerly *Quercus michauxii*), also known as cow oak or basket oak, is a large handsome tree suited primarily to rich moist soils.

The swamp white oak (*Quercus bicolor*) is a roundheaded medium-sized oak with dull dark-green leaves and is native to moist ground from Kansas to Maine.

The Texas red oak (*Quercus texana*) is a small tree found in Texas and neighboring regions. It is a relative of the red oak and well adapted to roadside planting near the borders of the dry-farming country.

The water oak (*Quercus nigra*) is frequently confused with the willow

oak and the laurel oak, as these are not distinguished from one another except by close observers of trees. It is probably more often transplanted than any other tree in the Southeastern States and is the "weed" of the southern oaks, for it is comparatively short lived. Because it seems to be more subject to attacks of mistletoe and is more easily affected by windstorms than the willow oak, the Darlington oak, and the laurel oak it is less desirable, and its planting should be avoided.

The white oak (*Quercus alba*; fig. 17) is one of the finest, if not the finest of American trees, with broadly spreading branches that make a round top of more than 80 feet, with medium-sized dark-green leaves having a lighter under surface and almost white flaky bark. It thrives over a wide territory, growing wild in Texas and Nebraska and thence to Maine on both uplands and bottom lands where it is not too wet, and when grown in the open it suggests stability and strength. It is one of the slow-growing trees, but is worthy of extended planting.

The willow oak (*Quercus phellos*; fig. 18), sometimes erroneously called water oak and pin oak, is one of the best of the quick-growing trees for use in the South Atlantic and Gulf States. It is frequently used with the water oak for street planting, but it can be readily distinguished from it. Because



FIG. 16.—Red oak

it is longer lived and its equal in every respect, it should be given the preference. Trees of this species which apparently have been planted about 80 years are found in excellent condition, while water oaks planted at the same time have either entirely disappeared or are showing marked evidence of decline. Figure 19 shows the characteristic appearance of the leaves of these nearly related species of oaks. That the willow oak is readily transplanted in the South when of comparatively large size, is proved by the success with which trees 12 feet high are dug from the woods and planted. In the extreme South this tree is nearly half evergreen, but its foliage does not assume the bright colors of the trees of the red-oak class.

OSAGE-ORANGE

The Osage-orange (*Toxylon pomiferum*, also known as *Maclura pomifera*), native in the southern part of the Mississippi Valley, is a small tree with bright-green leaves and many thorns and is useful in parts of the dry-farming regions where better trees are hard to cultivate.

PALMS ¹⁰

Several varieties of palms are used more or less for planting in the warmer parts of California and in southern Florida. Though sometimes effective for formal decoration, they can hardly be considered shade trees.



FIG. 17.—White oak



FIG. 18.—Willow oaks

Palmetto

Palmettos, often called "sabals," native fan palms, abound near the coast from South Carolina to Texas and in the adjoining portions of Mexico and

¹⁰ The palms are treated on the basis of notes furnished by O. F. Cook, of the Bureau of Plant Industry.

may be grown in the southern part of Florida and in the warmer parts of California, though seldom satisfactorily close to the Pacific coast. They can be used effectively for formal plantings, but they are not useful as a substitute for shade trees. Their leaves and damaged roots should be cut off in transplanting, and they should be set about 3 feet deep in their new location.

The cabbage palmetto, infrequently called the Carolina palmetto (*Inodes palmetto*), is a native of and useful in Florida and the adjacent coast regions, where it sometimes attains a height of 60 to 80 feet. It will thrive in the warm valleys of California, but is used less there.

The Texas palmetto (*Inodes texana*)¹¹ is especially valuable for southern Texas, where it is indigenous, succeeding generally in the warm valleys of California and in northern Florida and the adjacent coast regions. It grows to a height of 40 feet and in appearance is distinct from the Carolina palmetto, the leaf segments being much broader and less drooping.



FIG. 19.—Leaves of the most characteristic southern oaks: A, Live oak; B, willow oak; C, laurel oak; and D, water oak

The Victoria palmetto (*Inodes exul*)¹² is another hardy species, probably a native of Mexico, but grown for many years at Victoria, Tex. It is similar to the native Texas species and worthy of general planting in the same region. A feature of this species is that the persistent leaf bases remain alive and green for many years instead of turning yellow or brown, as in the Carolina palmetto.

Washington Palms

Washington palms (fig. 20) are a very conspicuous feature of ornamental planting in southern California. Two species are represented—the California Washington palm (*Washingtonia filifera*), known to foresters as California palm, and Mexican Washington palm (*Washingtonia robusta*), the former na-

¹¹ Anonymous. The Texas palmetto. *In Jour. Heredity*, vol. 8, p. 123, illus. 1917.

¹² Cook, O. F. A new ornamental palmetto in southern Texas. *In U. S. Dept. Agr., Bur. Plant Indus. Cir.* 113, pp. 11–14. 1913. Out of print.

tive to the canyons and barren slopes that surround the Coachella Valley of southern California, the latter probably brought by way of the Isthmus of Panama from the region of San Jose del Cabo, the extremity of Lower California, in the early days of travel. The name "robusta" alludes to the fact that this species grows much more rapidly in height than *Washingtonia filifera*, though the trunk is more slender. Both species are hardy and thrive in California in the Sacramento Valley and southward, in Florida, and along the coasts of near-by States. The Mexican Washington palm requires less heat than the California Washington palm, but both will endure several degrees of frost. Even in California the Mexican Washington palm is distinctly preferable for localities near the coast. In the vicinity of San Diego the leaves of the California Washington palm become badly infested with a parasitic fungus that does not attack the Mexican Washington palm.

Other Hardy Fan Palms

The species most commonly used for ornamental planting in the California coast districts is the windmill palm (*Trachycarpus excelsa*), sometimes called the Chinese fan palm. This has a slender trunk clothed with brown fibers, flat fan-shaped leaves, and rather straight radiating segments. The same species



FIG. 20.—Washington palms, showing *Washingtonia robusta* in the foreground on the left and *Washingtonia filifera* in the foreground on the right

is hardy at New Orleans and Charleston, and even at Laurens, S. C., at an altitude of 600 feet, but it does not thrive in the sandy soil of Florida.

The hair palm (*Chamaerops humilis*), also known as vegetable hair palm, a native of Spain, Sicily, and North Africa, is similar to the Chinese palm but smaller and more compact and with large sharp spines on the petioles of the leaves. When young it suckers from the base, like the date palm, so that clusters of it may be formed.

The Guadalupe palm (*Erythea edulis*), also known as Guadalupe Island palm, is one of the most popular species in southern California in the region of Santa Barbara, Los Angeles, and San Diego. This palm is a native of Guadalupe Island, off the coast of Lower California, and is not known to occur elsewhere in the wild state. It is well adapted to the cool coast climate of California but not to the interior valleys. It is smaller than the Washington palms, with a rather short trunk, 15 to 20 feet high, and a dense crown of fresh green leaves.

The blue palm (*Glaucotea armata*, formerly known as *Erythea armata*), also known as California blue palm,¹³ formerly placed in the same genus with

¹³ See Cook, O. F. *Glaucotea*, a new genus of palms from Lower California. *In Jour. Wash. Acad. Sci.*, vol. 5, p. 236-241. 1915.

the Guadalupe Island species, is very distinct in habits as well as in general appearance, having bluish or grayish green leaves, strongly toothed petioles, and long slender inflorescences. The trunk is very robust, often 2 to 3 feet in diameter, and is said to attain a height of 30 to 40 feet in Mexico. Several of these features are shared with the Washington palms. The blue palm also has the ability to grow in the dry hot interior valleys. In Texas it has proved hardy at San Antonio and even as far north as Austin.

Date Palms

The Canary date palm (*Phoenix canariensis*; fig. 21), usually known as Canary Island date palm, is very popular, being more hardy than the true date palm, larger and more vigorous in growth, and producing no suckers from the base of the trunk. Well-grown specimens in the California coast districts with trunks from 2 to 3 feet thick and immense crowns of spreading deep-green leaves are among the most imposing forms of plant life. Though less robust in other regions, the species is very hardy and adapted for planting anywhere in the palm belt of either the southwestern or southeastern United States.

The true date palm (*Phoenix dactylifera*) is adapted to the San Joaquin Valley and southeastern California, but it is much inferior to the Canary



FIG. 21.—Canary date palms

species for ornamental use because the foliage is less attractive, owing to its habit of sending out suckers from the base of the trunk.

The Coconut and Its Relatives

The true coconut palm is confined to a narrow belt along the coast of southern Florida, but other species of *Cocos* are planted in the coast districts of California. The species that is most prominent in park and street plantings around San Diego, Los Angeles, and Santa Barbara is the San Diego palm (*Cocos plumosa*, or *Cocos romanzoffiana*) a rather tall, slender palm with a long-jointed trunk about 1 foot in diameter and long, spreading, feathery deep-green leaves. Another series is represented by *Cocos yatay* and several similar species, often called *Cocos australis* in nursery catalogues. They have short thick trunks, very glaucous grayish or bluish foliage, and fleshy, edible, highly flavored fruits, somewhat like pineapples. These gray-leaved species are very hardy. Another coconut relative is the sirup palm (*Jubaca chilensis*; also known as *Jubaca spectabilis*), sometimes called Chilean molasses palm, which has a massive trunk 3 or 4 feet in diameter, specimens of which are growing at a few places in California.

Other Pinnate Palms

The amethyst palm, a native of Australia, is commonly planted in California. It usually appears in lists and nursery catalogues as *Seaforthia elegans* or *Archontophoenix alexandrac*, but it is now recognized as distinct from both of these species and has received a new name, *Loroma amethystina*. Except

certain species of Phoenix and Cocos it is the only pinnate-leaved palm that grows freely in the open air in the coast districts of California from Santa Barbara to San Diego. In habit and general appearance *Loroma* is more like the royal palm, though with a smaller trunk and fewer leaves. The pinkish purple drooping inflorescence is very attractive and develops into a large cluster of scarlet berries.

The royal palm (*Roystonea regia*) and other species of *Roystonea* are perhaps the most striking ornamental members of the whole group. They can be grown in southern Florida and even exist in the wild state in some of the hammocks below Miami.

PEPPERTREE

The peppertree (*Schinus molle*) is much used in southern California. It is a moderate-sized broad-headed tree with fine foliage, which gives it a light, airy appearance (fig. 22). During the fall and winter it is covered with scarlet berries, which in contrast with the persistent foliage produce a pleasing effect.

PINE

The pines are coniferous evergreen trees that as a rule are not so good for roadside planting as the deciduous trees, although some of them grow with a trunk and therefore are more adaptable than those trees that retain their



FIG. 22.—Peppertrees

limbs from the ground. They are most valuable in sections where the roadside plantings are needed to help as windbreaks as well as for shade and in the regions farther north than those in which the hardwoods thrive.

The Austrian pine (*Pinus nigra*), a native of Europe, is a large, symmetrical tree that thrives on the Great Plains, where few good trees are available.

The Aleppo pine (*Pinus halepensis*) is a medium-sized tree from the shores of the Mediterranean with rather sparse short grayish foliage, that does not stand much frost but is useful near the seacoast, on poor soil, and under other adverse conditions. It is not desirable where more attractive trees can be grown.

The digger pine (*Pinus sabiniana*), also called bull pine, is a native of California that sometimes reaches a height of 80 feet. It is especially promising for the lower altitudes of the Sierra Nevada, although it will not withstand severe cold.

The jack pine (*Pinus banksiana*) is a medium-sized tree of not very attractive appearance, but it will stand severe cold and is suitable for planting along much of the Canadian border and in the northern Great Plains.

The Jeffrey pine (*Pinus jeffreyi*), native to Oregon and California, is a handsome spreading pyramidal pine that sometimes attains a height of over 120 feet and bears long needles. It thrives on poor dry soils and is not hardy north of Massachusetts or on the northern Great Plains.

The loblolly pine (*Pinus taeda*), sometimes known as old field pine or frankincense pine, is a large tree, not strikingly ornamental but useful near the borders of the dry-farming area in the southern half of the country, where the number of good trees is not large.

The longleaf pine (*Pinus palustris*) is a large handsome oval-topped tree (fig. 23) with exceedingly long bright-green needles, most striking in the spring, when the bright-yellow catkins cover it. It is native to the southeastern part of the country, where it can be used effectively.

The Monterey pine (*Pinus radiata*) is native to the coast of California south of Monterey Bay and is a handsome roundheaded green-foliaged pine that is useful in California at the lower elevations and in other places with moderate temperatures.

The red pine (*Pinus resinosa*), by lumbermen called Norway pine, is a medium-sized to large handsome tree, suitable for cold regions and is adapted for planting from a little west of the Great Lakes to the Atlantic Ocean.

The Scotch pine (*Pinus sylvestris*) is a large moderately ornamental tree that thrives under the adverse conditions of the Great Plains regions as well as under the more humid conditions farther east. It is especially useful where the more ornamental trees do not thrive.



FIG. 23.—Longleaf pines. In the region where they grow such a snow cover is unusual

The shortleaf pine (*Pinus echinata*), sometimes called spruce pine or yellow pine, is a large handsome oval-headed tree with bluish green needles 5 inches long, native from New Jersey to central Texas, and is especially useful in Texas and Oklahoma.

The sugar pine (*Pinus lambertiana*) is one of the tallest of pines and makes a handsome tree. It is slow growing in the east and is not hardy in the colder parts of the country.

The western white pine (*Pinus monticola*), native of the western mountains, is useful for planting in its native habitat as well as in the eastern United States north to Massachusetts.

The western yellow pine (*Pinus ponderosa*), sometimes called bull pine, is another of the hardy pines that thrives on the dry Plains and is worthy of use under those conditions, although it also succeeds under the more humid conditions of the Eastern States except in the colder parts.

The white pine (*Pinus strobus*; fig. 24), called by lumbermen eastern white pine, is a large roundheaded tree until its brittle wood is broken by ice storms. It grows more than 100 feet high, is very ornamental with its bluish green foliage and sturdy form, and is worthy of extensive planting.

PITTOSPORUM

The Queensland pittosporum (*Pittosporum rhombifolium*) is a tender ever-green tree bearing bright-yellow berries through fall and winter that are attractive in contrast to the dark-green foliage. It is pyramidal, often attaining a height of 60 feet, and is useful in the warmer parts of California, Arizona, Texas, and Florida.

PLANETREE

The American planetree (*Platanus occidentalis*), known to lumbermen as the sycamore and also called the buttonwood and buttonball tree, is a large, open, spreading, quick-growing tree native along watercourses. It is adapted to the Pacific slope and the eastern half of the United States and is worth trying at many places in the intermediate sections. Its habit of shedding its outer bark in large flakes, leaving the white new bark showing in large patches, makes it a conspicuous tree wherever grown. The fruits are balls 1 inch or more in diameter, which sometimes break and scatter when falling. This and the shed bark are occasionally considered objectionable, but because

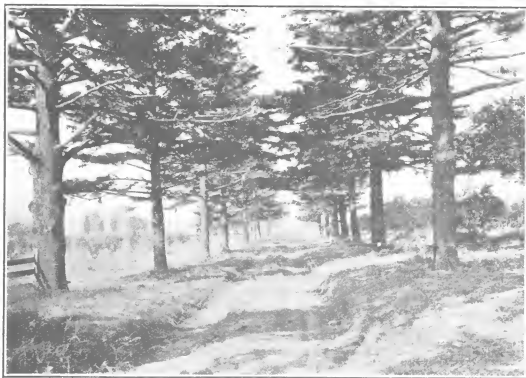


FIG. 21.—White pines

it is such a strong-growing handsome tree and succeeds well it is being planted frequently. It will stand more pruning and shaping than most trees, which, with its high head, open habit of growth, and light-green foliage, giving an impression of airiness with the shade, are distinctive advantages. It is subject to attack by a fungus that kills or partially mutilates the leaves and young twigs when small, giving them an unsightly appearance. In some places this trouble is quite serious.

The California planetree (*Platanus racemosa*), known to lumbermen as California sycamore, is a native of California adapted to the whole Pacific slope and is similar in general characteristics to the American planetree.

The London planetree (*Platanus acerifolia*) is one of the Old World forms of sycamore. According to Alfred Rehder,¹¹ "the true oriental plane is rare in cultivation, the tree usually planted under this name being *Platanus acerifolia*." It is more compact in habit of growth and possesses the other good qualities of the sycamore. It is being more frequently used and proving satisfactory on the Pacific slope and east of the Missouri River and may

¹¹ Bailey, L. H., ed. Standard Cyclopedia of Horticulture, vol. 5, p. 2707. New York, 1916.

be found useful on the southern Great Plains. Because of its more compact habit and comparative freedom from disease, it is a more desirable tree for ordinary use than the American planetree, though it is tender in the northernmost parts of the country.

POPLAR

The poplars are useful in the western half of the country. Several kinds thrive where other trees do not succeed and seem to make more desirable trees than they do in regions where the conditions for tree growth are considered more favorable. In humid regions some of the most used species are brittle, although they make large handsome trees in situations where wind or ice can not break them. They reach their best development in the open country in well-watered soil, but are also useful within the reach of manufacturing establishments where there are much smoke and fumes from commercial processes. In many places they are subject to serious attacks from borers.



FIG. 25.—Carolina poplars

The balm-of-Gilead poplar (*Populus candicans*), the name of which is often shortened to balm-of-Gilead, has a broad irregular top of moderate size with dark-green leaves, but the tree is short lived and root-sprouts rather badly.

The balsam poplar (*Populus balsamifera*), also known as tacamahae, is native from a little south of the Canadian line northward, makes a narrow head, and is attractive and long lived, but because of its outline it needs to be planted with an abundance of spreading trees.

The black balsam poplar (*Populus trichocarpa*), known to lumbermen as black cottonwood, is native from California to Alaska, where it makes a wide-topped tall tree especially useful in the western third of the country.

Boleleana poplar (*Populus alba pyramidalis*, sometimes called *Populus bolleana*) is in form much like the Lombardy poplar and needs to be used sparingly with an abundance of broad trees.

The Carolina poplar (*Populus eugenei*), southern cottonwood (*Populus deltoides*, known to lumbermen as eastern cottonwood), Carolina cottonwood (*Populus angulata*), and northern cottonwood (*Populus virginiana*, usually known as *Populus monilifera* and known to lumbermen as southern cottonwood) are so similar in their adaptability for planting purposes that they

will be discussed together. They are easily propagated, easily transplanted, quick growing, and where they reach maturity under normal conditions form very large oval-headed handsome trees (fig. 25). They begin dropping their leaves early in the autumn. Their root growth is vigorous, especially in moist soils. They should not be generally planted where good types of trees will thrive; but from the Sierra Nevada and Cascade Mountains eastward to the one hundredth meridian and where smoke and fumes in the air prevent the growing of other trees their use is often desirable for the lack of better kinds.

The Fremont cottonwood (*Populus fremonti*), known to lumbermen as cottonwood, also called western cottonwood, has a large head and stout branches drooping at the ends and is especially useful in the southwestern United States, where it is native.

The largetooth aspen (*Populus grandidentata*), native in the northeastern part of the country, makes a tall, straight tree.

The Lombardy poplar (*Populus italica*; fig. 26) is a tall columnar tree adapted for formal effects or on narrow lanes. It is short lived in many places, owing largely to the European poplar canker, but otherwise it is a satisfactory tree in all parts of the United States. The trees may be planted as close together as 30 feet.

The narrowleaf cottonwood (*Populus angustifolia*; sometimes erroneously called *Populus fortissima*) is a moderate-sized conical tree on the Plains and at moderate altitudes in the Rocky Mountains. It is a useful roadside tree in these regions and in those with similar conditions.

The Petrovski poplar (*Populus laurifolia*) is a Siberian species that withstands both drought and cold admirably and is desirable where a rather upright variety is needed.

The quaking aspen (*Populus tremuloides*), known to lumbermen as aspen and often called quaking asp or American aspen, is native to the northern third of the country and southward in the western mountains almost to Mexico. It is a slender tree, usually not growing very large.

The Siberian poplar (*Populus suaveolens*; also known as *Populus balsamifera intermedia*) is a tree giving the utmost satisfaction in the intermountain country, where it withstands heat, cold, and drought well. It is of close growth but spreading habit, with leaves shaped much like the narrowleaf cottonwood, thick with a white under surface. It is not a tall tree.

The silver poplar (*Populus alba nigra*), often erroneously called silver maple, has small maple-shaped leaves with a snow-white under surface and a light-green upper surface. The tree is large and rather attractive, but it root-sprouts badly. It is best planted with other trees.

The smoothbark cottonwood (*Populus acuminata*), called lanceleaf cottonwood by lumbermen, is native to the eastern slopes of the Rocky Mountains and is useful in its native habitat and adjoining territory.



FIG. 26.—Lombardy poplars

REDCEDAR

This attractive tree is discussed with junipers.

RUBBERTREE

The India rubber tree (*Ficus elastica*; fig. 27) is a large-headed handsome evergreen, suitable for the almost frost-free regions of California and Florida.

RUSSIAN-OLIVE

The Russian-olive (*Elaeagnus angustifolia*) is a shrub or small tree growing 20 feet high, with grayish foliage. It withstands the conditions in the drier regions where not subjected to gummosis, a serious disease.

SEQUOIA

The giant sequoia (*Sequoia washingtoniana*, often called *Sequoia gigantea*), known as big tree by lumbermen, is the largest of our native trees and is native to the Sierra Nevada. It is being cultivated successfully in the regions west of where it is found growing wild.

The redwood (*Sequoia sempervirens*) is found in the Coast Range of mountains, where it is being cultivated, and also in near-by sections.

SILK-OAK

The silk-oak (*Grevillea robusta*), sometimes called Australian fern, is a large handsome tree that succeeds well in the practically frost-free regions

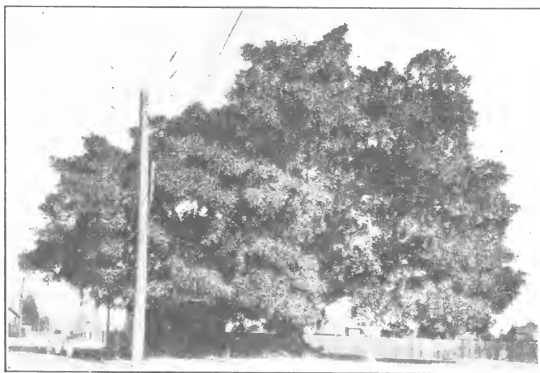


FIG. 27.—India rubbertree

of Florida, southern California, and Arizona if provided with a reasonable amount of moisture, as it stands drought remarkably well. It is covered in early summer with orange-colored flowers.

SILKTREE

The silktree (*Albizia julibrissin*), known throughout the South as mimosa, is a broad low tree (fig. 28) attaining a height of 40 feet, with compound leaves composed of many long narrow leaflets of a dull green that give it a light, airy appearance. In early summer it bears balls of tiny pink flowers an inch in diameter. It thrives from Washington southward and west of the Sierra Nevada.

SPRUCE

The spruces are cone-bearing evergreens usually cultivated with the lower branches resting on the ground and are therefore most useful where a wind-break is desired. They are primarily cold-country plants.

The Black Hills spruce (*Picea glauca albertiana*), a horticultural form of the Alberta spruce, and the western white spruce of lumbermen, is especially

useful on the northern Great Plains, while the Alberta spruce succeeds west of the Rocky Mountains.

The white spruce (*Picea glauca*; also known as *Picea canadensis*), a narrowly pyramidal tree, is useful in the States near the Canadian border.

SWEETGUM

The sweetgum (*Liquidambar styraciflua*), known to lumbermen as red gum, is adapted especially to light or sandy lands from New Jersey to Florida and Texas and also does well on the Pacific coast. It forms an oval-headed handsome tree with star-shaped leaves that assume a particularly brilliant hue in the autumn. Toward the northern limits of its successful cultivation it is difficult to transplant, but in the warmer sections of the country it can be moved with comparative ease. It should be transplanted only in the spring.

SYCAMORE

The handsome and useful trees generally known by this name are discussed under planetree.



FIG. 28.—Silktree, or mimosa

TAMARIX

The tamarix (*Tamarix* spp.), sometimes called salt cedars, are well adapted to dry and even alkaline conditions. The tops are not hardy in the coldest parts of the country, but they will stand killing to the ground annually and still put out vigorous growth each summer. They are mostly shrubs or very small trees.

Athel (*Tamarix aphylla*; formerly *Tamarix articulata*), a roundheaded tree more than 35 feet in height, is well adapted to alkaline and saline conditions in almost frost-free sections. These trees help to give a green appearance to roadsides where it is difficult to get large tree growth.

TULIPTREE

The tuliptree (*Liriodendron tulipifera*), called by lumbermen yellow poplar, is also sometimes called tulip poplar (fig. 29), though these names are unfortunate, because the tree is not a poplar nor even closely related. It is a large rapid-growing tree suitable for the Puget Sound region, close along the Pacific coast south to Santa Cruz Bay, and for the eastern United States from Indiana and Tennessee eastward.

The leaves are a light green of unusual form, the upper half appearing to have been cut away, leaving a notch at a point where it would seem the middle of the leaf should be. Because the roots are usually soft and tender, the tree needs to be transplanted quickly, with great care, and only in the spring. Small sizes should be used, especially near the northern limits of growth. After transplanting, if the top should die and a new vigorous shoot should put out from the root it would be desirable to form a new top from this shoot rather than to transplant another tree the following season.

TUPELO

The tupelo (*Nyssa sylvatica*), known to lumbermen as black gum, also called sour gum, gum, or pepperidge, is a large oval-headed tree with rather large dark glossy green foliage and almost black berries. It is native through the eastern third of the United States and is worthy of being planted.

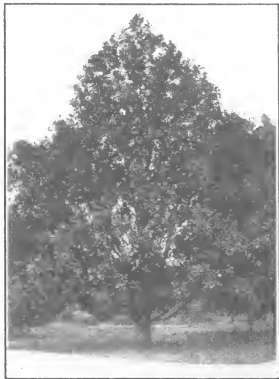


FIG. 29.—Tuliptree

The Persian walnut (*Juglans regia*), often called English walnut, is a medium-sized tree that will not stand as much cold but will endure more drought than the black walnut.

WILLOW

Many of the willows are hardy plants that seem to be well adapted to the cold dry regions and grow luxuriantly in the more humid climates.

The black willow (*Salix nigra*) is native to the eastern half of the country and appears to be one of the most dependable plants for the dry, cold regions farther west.

The desertwillow (*Chilopsis saligna*) is a small tree native in the dry regions of the Southwest, where it can help make the roadsides green when other plants can not be made to grow.

The golden willow (*Salix vitellina*), often called yellow willow, grows throughout the eastern United States but is probably not native. It also succeeds exceedingly well in the drier parts of the colder portions of the country, as well as in more humid climates.

YELLOW-WOOD

The yellow-wood (*Cladrastis lutea*) forms a broad-topped tree of medium height with gray bark showing tracings of lighter color as it becomes fissured. It has an abundance of clean bright-green foliage and clusters of white flowers in early summer. It is useful throughout the eastern United States.

Kcy.—BE=Broadleaf evergreens; C=desirable for the colder parts; c=will grow in the colder parts, but not desirable; CD=cone-bearing deciduous trees; CE=cone-bearing evergreen trees; D=deciduous plants; E=evergreen; F=desirable under favorable conditions as to moisture; f=will grow under favorable conditions as to moisture, but not desirable; G=a broad-leaved tree that holds its leaves well into the winter; H=half evergreen; M=naïve to much of the region; m=naïve to much of the region, but not very desirable; MD=mostly deciduous, but holding dead leaves through part or all of the winter; N=naïve, but not very desirable; ND=deciduous plants with narrow leaves almost like needles, but not cone bearing; NE=evergreens with narrow leaves almost like needles, but not cone bearing; P=partially evergreen; P=thrives; t=grows fairly well, though not as desirable as many other trees; U=has undesirable characteristics and does not grow well; W=desirable for the warmer parts; w=will grow in the warmer parts, but not desirable

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DATA APPLICABLE--Continued

[illegible]

TABLE 1.—*Trees adaptable to the various regions throughout the United States, showing their kind, height, spread, and nature of the soil best adapted to their successful growth—Continued*

DATA APPLICABLE—Continued

Variety of tree	Data applicable to region No.—																															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Poplar—Continued.																																
Narrowleaf cottonwood.....									M			M	N	T	N	T	T	T	T	T	T	M	N	n	t	N	m					
Petrovski.....									T			M	T	M	N	T	T	N	T	T	T	N	n	n								
Quaking aspen.....				N					T			M	N	T	N	T	T	N	T	T	T	N	n	n								
Siberian.....				t					T			T	N	T	N	T	T	N	T	T	T	N	n	n								
Silver.....									T			T	M	T	T	T	T	N	T	T	T	N	N	N								
Smoothbark cottonwood.....									T			T	M	T	T	T	N	N	N	N	N	N	N	N								
Southern cottonwood.....									T			T	M	T	T	T	N	N	N	N	N	N	N	N								
Rubber-tree, India.....									T			T	M	T	T	T	N	N	N	N	N	N	N	N								
Russian-olive.....									T			T	M	T	T	T	N	N	N	N	N	N	N	N								
Sequoia.....									T			T	M	T	T	T	N	N	N	N	N	N	N	N								
Giant sequoia.....									T			T	M	T	T	T	N	N	N	N	N	N	N	N								
Redwood.....									T			T	M	T	T	T	N	N	N	N	N	N	N	N								
Silk-oak.....									T			T	M	T	T	T	N	N	N	N	N	N	N	N								
Silktree.....									T			T	M	T	T	T	N	N	N	N	N	N	N	N								
Spruce.....									T			T	M	T	T	T	N	N	N	N	N	N	N	N								
Alberta.....									T			T	M	T	T	T	N	N	N	N	N	N	N	N								
Black Hills.....									T			T	M	T	T	T	N	N	N	N	N	N	N	N								
White.....									T			T	M	T	T	T	N	N	N	N	N	N	N	N								
Sweetgum.....									T			T	M	T	T	T	N	N	N	N	N	N	N	N								
Tamarit, athel.....									T			T	M	T	T	T	N	N	N	N	N	N	N	N								
Tulip-tree.....									T			T	M	T	T	T	N	N	N	N	N	N	N	N								
Tupelo.....									T			T	M	T	T	T	N	N	N	N	N	N	N	N								
Walnut.....									T			T	M	T	T	T	N	N	N	N	N	N	N	N								
Black.....									T			T	M	T	T	T	N	N	N	N	N	N	N	N								
California.....									T			T	M	T	T	T	N	N	N	N	N	N	N	N								
Mexican.....									T			T	M	T	T	T	N	N	N	N	N	N	N	N								
Nogal.....									T			T	M	T	T	T	N	N	N	N	N	N	N	N								
Persian.....									T			T	M	T	T	T	N	N	N	N	N	N	N	N								
Willow.....									T			T	M	T	T	T	N	N	N	N	N	N	N	N								
Black.....									T			T	M	T	T	T	N	N	N	N	N	N	N	N								
Desert.....									T			T	M	T	T	T	N	N	N	N	N	N	N	N								
Golden.....									T			T	M	T	T	T	N	N	N	N	N	N	N	N								
Yellow-wood.....									T			T	M	T	T	T	N	N	N	N	N	N	N	N								

TREE CHARACTERISTICS

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TABLE 1.—Trees adaptable to the various regions throughout the United States, showing their kind, height, spread, and the nature of the soil best adapted to their successful growth.—Continued

TREE CHARACTERISTICS—Continued

Variety of tree	Characteristic of tree (see key)	Height (feet)	Spread (feet)	Soil and location																			
				Clay	Loam	Stony	Gravel	Sand	Alkali	Limestone	Bottom	Upland	Hillside	Ridges	Rich	Medium	Poor	Dry	Well drained	Medium	Moist	Wet	Stream banks
Rubbertree, India.	BE	70	70																				
Russian-olive	D	20	20																				
Sequoia:																							
Giant sequoia	CE	120	60																				
Redwood	CE	120	60																				
Silk-oak	BE	80	50																				
Siktree	D	40	40																				
Spruce:																							
Alberta	CE	60	40																				
Black Hills	CE	60	40																				
White	CE	60	40																				
Sweetgum	D	70	50																				
Tamarix, athel	D	35	20																				
Tuliptree	ND	75	20																				
Tupelo	D	100	75																				
Walnut:	D	80	60																				
Black																							
California	D	100	80																				
Mexican	D	60	50																				
Nogal	D	30	20																				
Persian	D	50	30																				
Willow:	D	70	60																				
Black																							
Desert	D	60	40																				
Golden	D	20	15																				
Yellow-wood	D	60	50																				

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